The Monthly Review

Published by the AMERICAN ELECTRO-PLATERS' SOCIETY

JUNE 1938

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INTO THE FUTURE

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FROM THE PAST

Since the establishment of Hanson-Van Winkle-Munning in 1820, our organization has always looked *into the future* toward continued advancements and improvements in the electro-plating field.

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We have seen plating equipment and supplies change from crude adaptations of some individual's favorite practice to well-designed and thoroughly engineered products developed to meet definite chemical reactions and keep step with modern production demands.

Our part has been always to keep looking *into the future* — to work in advance of current practice — to seek out new methods — to design new products — to add new improvements — to find new ways. As the growth of the plating industry has helped our growth — so our growth has helped that of the industry.

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The Monthly Review

Published by the AMERICAN ELECTRO-PLATERS' SOCIETY

A Society for the Advancement of the Science of Electro-Plating

JUNE 1938

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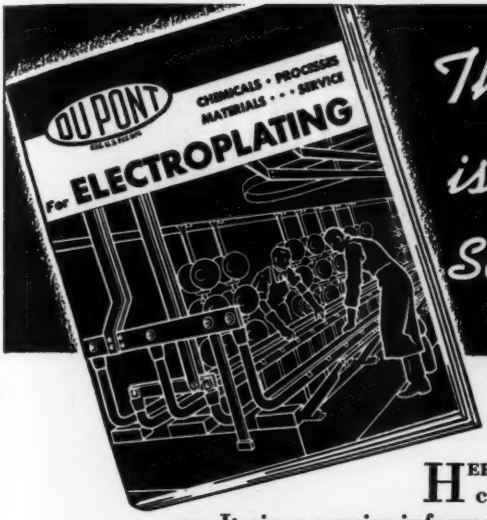

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The MONTHLY REVIEW

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VOL. XXV JUNE 1938 NO. 6

The 26th ANNUAL CONVENTION

The 26th Annual Convention of the American Electroplaters' Society will start on Monday morning, June 13, at the Schroeder Hotel, Milwaukee.

This year's meeting will be a memorable one as the delegates discuss the proposed changes in the constitution.

Early in January each member was handed a copy of the suggested revision and from that time to the present discussions on the proposals have been held in all our branches.

There should be very little time lost in discussing the majority of the items presented as there is not much difference in the wording as compared with the 1935 revision.

There are several major items, however, that may cause differences of opinion such as modifying the requirements for membership, the increase in per capita tax, and the clause relating to the convention profits. While we may not all agree on these provisions, there is no reason for fear if they are written into the new constitution after the convention is over.

Some of our members who had the best interests of the Society at heart predicted failure when we placed advertising in the REVIEW. Instead of the Society being divided as one prominent member prophesied when the suggestion was made, it has proved a great financial blessing, when we consider that in five years it has placed in the national treasury over twenty thousand dollars.

The revision committee has suggested nothing that can be considered detrimental to the Society if voted upon favorably. Regardless of how some may interpret the meaning of certain

clauses, the Society will still be in control of the foreman plater. On the other hand, most of our smaller branches are badly in need of leadership. This can be secured by using many of our associate members as branch officers. We have found that many an associate member has more time and ability and certainly more opportunity to make the necessary contacts so essential for a successful branch than have many of our active members, some of whom are not qualified, and accept the office only because no one else will assume the responsibility.

In line with other organizations similar to ours, we are inviting all those interested in plating to join us. Successful societies like the Society for Metals have felt this to be good policy; we should profit from their experience and do likewise.

We hope there will be no widespread difference of opinion during our deliberations, we anticipate a fair and frank discussion with no hard feelings regarding the outcome. This is the way the A.E.S. has always conducted its business. This year should not be an exception.

We commend very highly the work of the convention committee with Vice-president R. M. Goodsell as chairman. Every member of Milwaukee Branch who has been given a job to do, has come through with flying colors. All of which means a successful convention.

President A. B. Wilson has been a hard and consistent worker and he has had the cooperation of the executive board during his administration. He has accepted no financial assistance since he assumed office choosing to pay his own travelling expenses wherever he went. The Society owes him a deep debt of gratitude for services rendered during the year.

To those who have contributed to the well being of our organization, officers, branch secretaries, our advertisers, abstractors, and many other friends, we express our sincere appreciation.

We are hoping for the continued support of the incoming officers by our members, as only through your loyalty and cooperation can we achieve the objectives which are planned for the betterment of the A.E.S. now and in future years.

Rubber *in the* Plating Room

PAPER BY
MANSON GLOVER
Stoughton, Mass.

Given at the Boston Branch
American Electro-Platers Society
April 7, 1938

WITHIN a very few years past, rubber has become a standard material in electroplating. The first adaptations of rubber in the industry were naturally hit-or-miss—attempts to take advantage of known values in a field where they had not been established. The initial results were very variable, as we might expect from the methods of introduction; but the energetic research of standard rubber companies has overcome most of the uncertainty, provided suitable insulations for most situations, and extended the usefulness of rubber into processes where at first it was hopeless.

This research has been necessary because no single rubber compound combines all the best qualities of the material. Rubber in general is tough, durable, and elastic; chemically resistant, and tolerant of considerable warmth. The most resistant rubber, however, may be very brittle; and the toughest and stretchiest is useless in contact with chemicals that some less elastic compounds handle very well. There is usually a small range of best compounds for a given job, and these are being rapidly identified for plating work.

Rubber, however, is a costly material compared with paint; and its use has to be justified by economies that offset the expense. These economies are definitely present. Rubber insulation preserves equipment, conserves materials, and saves current. Rubber tank linings prevent tank corrosion, save shutdowns, and eliminate the heavy cost of delays and installations. They prevent leakage losses of valuable electrolyte, they minimize contamination of sensitive baths, they have saved in carefully controlled commercial installations as much as 30 per cent of the electric bill. Anode metal is saved by rack insulation that stops plating-off; and work is speeded up by insulations that allow anodes to be arranged for best efficiency regardless of the work carriers.

Applications are now being made from compounds of the latex which is the source of all rubber. Latex is a milky sap-like liquid, obtained by tapping rubber trees. It contains normally some 30 per cent of rubber particles suspended in water, with certain soluble serums. Evaporation of the water leaves the crude rubber of commerce. Before evaporation, however, the latex can be mixed with chemicals that permit it to be vulcanized like any other rubber. These latex mixtures have advantages in convenience that give generally a low cost; but they are inclined to be rather porous and many compounds are unsuitable for use in plating.

Milled rubber, which is more common, is made from imported crude rubber washed clean of all solubles and mixed with suitable chemicals on a mill which breaks down its structure and produces a uniform mass throughout. It is applied in sheets, usually over strong cements, and is vulcanized in place by intense heat.

Vulcanization determines the degree of hardness. Roughly speaking, all useful rubber is vulcanized. Soft rubber, like latex tank linings and automobile tire treads, has two or three per cent of sulphur combined with the rubber molecule. Hard rubber, the Ebonite of combs and telephone receivers, has around 39 per cent sulphur on the basis of rubber solids. Hard rubber tends to be chemically resistant but easily chipped and shattered. Soft rubber is elastic and takes a beating, but will endure fewer corrosives than hard. Between the two is semi-hard rubber, much like hard in appearance but with a certain amount of elasticity and stretch, which will endure a good deal of mechanical abuse with—in the right compounds—good chemical resistance. It is complicated to apply, however, and somewhat costly.

Note that we say above—"in the right compounds." There is a rubber to handle any common plating process except chrome and intense heat. But there is no satisfactory Sovereign Remedy for plating troubles in any single compound. A rubber that thrives on battery acid may practically dissolve in ordinary tap water, and vice versa. A badly selected compound may fail to stand up, permit active rusting of the plating tank, and

finally fall off in patches; or without any visible damage to the rubber it may release chemical elements that upset the balance of a delicate bath and give the plater sleepless nights trying to account for mysterious failures. At that, tank linings are easier to compound than rack insulation; the tank offers a single problem, while the plating rack may find itself splashing through water of two temperatures, acid, caustic, and cyanide copper before it finally settles down to its job in the plating tank. Rack coverings must be selected with skill and knowledge.

This knowledge is being painstakingly acquired. One rubber company, for instance, tested more than 100 compounds before adopting a standard for one particular plating cycle—and every one of the hundred-plus was considered hopeful before tested.

If the compound problem is difficult on racks, the problem of adhesion is simple. Most racks will hold a good rubber almost by pure shrinkage, and a suitable compound will stay put of itself. On tanks the adhesion problem is different. The usual method is application of a special cement to the metal, a grading off from that cement through several steps to a soft cement next the rubber, and the rubber film over the soft cement. With heat vulcanization, such a method can give a practically integral adhesion to metal.

There is a considerable range of suitable rubbers for tank linings. Soft latex rubbers do well in many plating baths and other tanks containing strong solutions, but not so well at high temperatures or in some very dilute liquors. Heat calls for hard rubber; but since hard rubber is brittle and has hardly enough "give" to take up expansion and contraction of the tank itself, the hard rubber should be cushioned with soft in some such coating as the Triflex. This combination, in which the hard rubber lies between layers of soft like the meat of a sandwich, takes adequate care of both chemical and mechanical hazards. For very high temperatures—above 150° F—soft rubber may be used on the tank with a 4-inch course of acid brick inside it to bring down the temperature at the rubber surface.

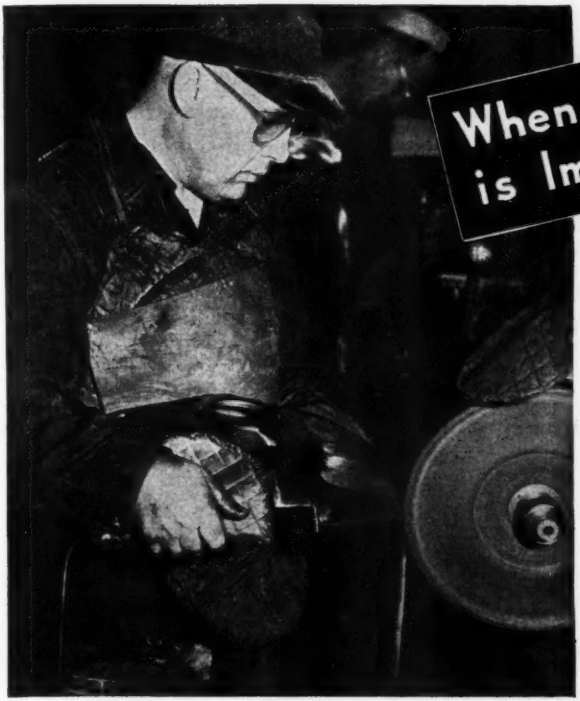
A tank should be well constructed and carefully installed. It should be rigid, smooth inside, and sandblasted. Fittings should hold anodes well clear of the walls. The metal of the walls should not be grounded, but should be well insulated when the tank is set down in place. Given these precautions, a good lining will have a long life in the tank.

Rack design and construction are also important in getting results from insulation. Sharp edges make for grief; rubber shrinks away or cuts on these edges under abuse, and the insulation loses much of its life. Spines can perfectly well be made of rods rolled with a 1/16 radius on the edges. The spine section must also be big enough for its job. A miserly small rod or a steel spine of size calculated for copper or brass will generate enough heat to burn off an insulation in short order.

Hard rubber is commonest on racks, and is satisfactory under careful handling. Human nature being what it is, however, hard rubber's brittleness and tendency to shatter is a serious fault. It is also rough, with some dragover as a result. Well cured soft rubber has done well in many nickel cycles; it is not fully proven, but has the promising advantage of ease of application and low cost. A recent development is latex semi-hard rubber. This is a comparatively expensive application; but it is absolutely non-shattering, will take a great deal of abuse before cracking or cutting, has a desirable water-shedding slick surface, and is reported to compare well with hard rubber —"in the right compounds"—for corrosion resistance.

The rack covering must not be porous, because porousness multiplies dragover and soon upsets balance of solutions. It must stand up under the acids of the cycle and not turn gummy, for fear of damage to work. A number of otherwise good coatings recently developed are unsuitable for these reasons.

Insulated anode scrap savers are a recent innovation. These are baskets hanging from the bus bar, fully insulated, carrying heavy loads of scrap anode metal with one good anode to carry the plating current. The economy lies in the difference between pound cost of new anodes and the junk price obtainable for the scrap.



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The above summarize briefly the ways in which rubber serves the plater. But notice that the best possible rubber setup is not a free license to abuse equipment. Labor on the line should give rubber the same respectful treatment that a less durable material would receive. A temperature of 140°—common in bright nickel work—is perfectly suitable for the right compound; but a tank that shoots up to 180° is ruining its rubber. Dirt and sludge should be kept out of the tank, since these are likely to carry greasy or other elements that attack rubber. (Continuous filtration generally pays for itself.) Work that drops into the tank should be promptly removed. Anode bags should hang two clear inches from the lining. The rubber manufacturer should also be consulted for any other recommendations that are called for by the particular job in hand.

In fact, the biggest risk the plater runs is in holding out on the rubber man. If there is some novel twist in the cycle involving an unusual chemical or a high temperature or a concentration of acid above normal, that fact may make a difference in the rubber specification. The thousand-hour accumulations of lab experience do not help the plater who won't divulge. The ethical rubber supplier is as safe under consultation as your own lawyer, and the wise operator will put the facts before him in buying rubber.

Given complete confidence and cooperation, the expectation is that rubber in the plating room means materially better work at materially lower costs.

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Simple Ideas That Worked

BY
*W. S. BARROWS**
Read at New York 1937 Convention

ABOUT thirty years ago I visited a job plating shop in Toronto, and was told by the proprietor that he had gold plated six brass hoops for a whiskey barrel, in a pint of gold solution. I doubted the truthfulness of the statement, and the proprietor escorted me to a nearby saloon and pointed with pride to a splendidly finished barrel elevated behind the bar, and upon which were six gold colored hoops. But, as I was not particularly interested in gold plating barrel hoops in a pint of gold solution, the incident did not impress me greatly at the time. However, when he asked me how we cleaned steel tubular parts preparatory for plating, and I told him we used scouring brushes, I was impressed by his suggestion that we try cleaning the tubes with pumice applied to the palms of our hands. There was a simple idea when compared with gold plating a barrel hoop in a pint of gold solution, but it was something I could employ. It might mean economy in brushes, time and pumice, and it might prove to be more or less severe on the hands. Nevertheless, we tried it and gradually dispensed with brushes, suffered no inconvenience from sore hands, and for several years we used the idea successfully.

I mention these instances merely to illustrate why I have compiled the simple ideas included in this paper. Some of our members may not be particularly impressed by the statement that "a monovalent ion carries only one third as much current as a trivalent ion," or that "most electrodeposits are decidedly anisotropic crystallographically and exhibit fibrous or columnar structures," or in methods of measuring cathode polarization, but may find some degree of satisfaction from the adoption of one or more of the suggestions incorporated in this elementary effort.

H. Addington Bruce once wrote: "It is a fine thing to have

* Foreman Electroplater, Toronto Branch

ideas, but it is not enough merely to have them. To be worth anything, ideas must be vitalized by being put into action. Thinking must be followed by doing."

I have been guilty of inactivity with respect to vitalizing ideas and wish it to be understood that no claim is made for originality in ideas mentioned in this paper. But as I have never heard them mentioned, or read of them being employed, I shall endeavor to present them freely and clearly.

In shops where equipment is comparatively modern, these ideas may not apply. When I first thought of preparing this paper, the small shop was in my mind. I fancied the platers in small plants might find the ideas useful, but when I recalled visions of some equipment seen in large plants, my courage was greatly strengthened, and I shall proceed with the ideas.

Possibly your plating room is located quite a distance from the source of steam supply, and even though you ordinarily have a steam pressure of 120 pounds, you may have difficulty getting solutions heated quickly each Monday morning. This trouble is usually most pronounced when a vacuum system of returning steam and water to the boilers is in use, and only one large steam trap is installed to serve several tank coils. To obtain temporary relief, the by-pass valve at the trap is opened for sufficient time to allow water in tank coils to be carried away.

Sometimes this proves ineffective unless the by-pass valve is open for a considerable period of time, then the fireman has something to growl about. To permanently remedy this expensive waste of time, patience and steam, install a small steam trap in exhaust steam line from each tank coil. An improvement will be noticed immediately, solutions will be heated quickly, temperature of solutions may be maintained uniform more easily, and the Monday morning bug-bear is ended.

Did you ever have a lead steam pipe burst in a nickel bath and find your nickel solution speeding away either to the boilers or the sewer? What a sense of responsibility such a catastrophe can create in the heart of any conscientious plater. Yet, such things happen. Usually we say little, if anything, about them because of a feeling of guilt. We realize we were either careless, thoughtless, or ignorant of the consequences that might results from unpreparedness. If the pipe from the lead coil

has an open end and water and steam pass into the air, and the coil in the tank bursts during a cold night in winter when the feed valve has been left slightly open to maintain some heat in the coils, the nickel solution will be siphoned out of the tank into the sewer. Lead steam pipe is not always uniform in wall thickness, a water hammer which a close observer would not notice, may rupture the pipe and much damage can result in a very short time. All shops do not have a daily inspection of steam and water valves; a valve which operates efficiently today may be defective tomorrow. To avoid unnecessary quantity of water passing into the lead coils when the valve is open on Monday morning, or after being closed for several hours, insert a by-pass in the feed line just above the valve which supplies tank coils. The by-pass will require two short nipples, a valve, and an elbow, and a length of pipe long enough to extend about a foot lower than the top of the tank. Let the lower end of the long length of pipe extend into a piece of pipe several sizes larger than the by-pass and, by means of reducing fittings, connect the large piece to a pipe line which will carry the water away. After accumulated water is all blown out of the line, the by-pass valve is closed, and the valve feeding tank coils are opened. Thus, only the water of condensation in the coils must be lifted up and out by the steam.

That takes care of the live steam end of the coil. At the outlet end of the tank coil and at a point about level with the top of the tank, solder a short nipple, screw a Tee on the short nipple; to the lower end of Tee place a short nipple, then a union, another short nipple and an insulator. From this point, the pipe may lead to the sewer or elsewhere. Now, to the horizontal opening of the Tee you placed at the end of the lead coil, screw a street ell with the end threaded inside turned upward. Get a short nipple (about two inches long), grind two sides of one end flat so that a wrench may be used on it, close the opening in that end by soldering on a thin disc of steel. Through the center of the steel disc drill a one-eighth-inch hole. Invert the nipple and place in it a steel ball, the size of which will depend upon the size of pipe used. About one-quarter inch below the ball, solder a piece of wire to retain the ball when the open end of nipple is screwed into the street ell. Simply screw the ball retaining nipple into the ell with the fingers, but

if left undisturbed for a considerable length of time, a wrench may be required to loosen it. Therefore, grind the sides of the upper end flat. With this simple addition to the exhaust steam line from the tank, it is absolutely impossible to create a siphon. It also acts as a safety device as it forms a means of escape if the steam pressure becomes excessive for any reason.

The cost is nil, the security and safety afforded is worth much to a foreman and proves of great value to the employer who pays the bill when gallons of solution go for a trip down the sewer and production is stopped until a new bath is prepared. A very simple idea, but truly practical and efficient.

When I decided to present a paper at this Convention, our plating-room maintenance man and I were quite jubilant over the success attending our efforts to construct a simple, silent water heater. Neither of us had ever seen or heard of such a device being manufactured. But, before we had proceeded far enough to be fully satisfied with our little silencer, we learned that several devices for the purpose are on the market and that our silencer was identically the same in principle. A description of our silencer was to have been one of the items included in this compilation of simple ideas, but we considered it advisable to exclude it.

So much for steam supply problems. There are many other little annoyances of a mechanical nature that embarrass us more or less frequently. We see a piece of equipment badly worn, we discard it, install a new outfit without a thought respecting possible repairs to the old machine or part of a machine. It is possibly a debatable question whether that is actually economy, but my experience has convinced me that many dollars may be saved annually in any plating room by the exercise of a little common sense with regard to dispensing with materials and equipment we may hurriedly declare useless. Someone has said, "The man with too much common sense misses a lot of fun". And I say, "The man devoid of a little common sense misses many a thrill of satisfaction". Mr. E. W. Tingley, in one of his splendid talks to foremen, which appeared in former issues of our MONTHLY REVIEW, asks, "Who should be responsible for electrical maintenance or plating barrels, tanks, etc., maintenance men or foreman of plating departments?" My

answer is, the foreman of the plating department. Naturally, there are many jobs necessitating help from the maintenance crew, but to make them responsible for care and repair of mechanical and electrical plating equipment—NEVER. Not unless you have men better informed respecting plating room practice than I have yet encountered in any shop maintenance crew. I think I could write a good sized book in answer to Mr. Tingley's question.

In 1918, rings of sparks were seen encircling one of the commutators of a 5.000 ampere plating generator. The men of the maintenance crew said, "All those brushes are burnt, no matter what is done to them they will never be satisfactory. Better order a new set right away". The machine had been in operation less than two years. There were 96 brushes on the machine; 48 brushes were declared useless. As soon as the maintenance men left the room, the brushes were taken off the machine. They were cleaned, filed smooth, and wiped. Then, while smoothing the commutator, a wire which led to a commutator segment was found broken. It was connected and soldered. Brushes were replaced carefully and the machine put in operation again. Those same brushes are in use today on that same machine, and the machine is daily producing current to within a very small margin of its rated limit.

A small generator used as exciter for a 1500 ampere machine operating a chromium bath became very troublesome. It sparked badly at times. The best brushes obtainable were worn away in a few weeks. Reversal of current was almost a daily occurrence. The exciter was removed, another small generator was installed temporarily and the defective machine sent to a reliable electrical repair shop with orders to undercut the mica on the commutator. That put an end to trouble with that machine. I am aware that some manufacturers of low voltage machines do not undercut mica. I do not contend that it is always advisable, but I do think it may often save a bunch of trouble for a foreman who finds it difficult to get a worn piece of equipment replaced with new.

For horizontal plating barrel cylinder construction today, bakelite or hard rubber is quite generally employed, but there are still many cylinders made of wood. Products plated in these wood cylinders vary from comparatively smooth parts to various

sizes of bolts, nuts, brackets, plates, strip steel, etc. The panels may be either celluloid sheet or bakelite, celleron, or some similar material. In either case, the portion of cylinder to show wear first, is usually the wooden ribs which extend lengthwise of cylinder and support the panels. When these ribs wear so that the edge of panel is exposed, parts being plated become wedged in the opening and allow small pieces to easily pass out of the cylinder while in operation. The ribs are usually about two and a half inches square, and to attempt to replace worn ribs generally proves very unsatisfactory or a total failure. Weak joints result in early disaster and at a time when loss of a batch of work or suspension of operations can cause an awful uproar. The idea that was used in this case was not only simple but has proved particularly profitable. Over each rib a length of split wood pulley bushing was fitted and secured by use of bolts made of fabric inserted celleron rod. One-half inch celleron rod was cut into three-inch lengths, reduced to three-eighths inch, leaving a one-eighth-inch head and threaded at the opposite end to take a nut which was made from three-sixteenth-inch sheet celleron. Formerly a wood cylinder used daily became a wreck in about one year. With the pulley bushing shields inserted, a cylinder now serves us in good condition for at least five years.

In some of the cylinders made expressly for use in cadmium solutions I believe the shaft, danglers, etc., are chromium plated when sold. Our outfit was not finished in this manner and we found that cleaning the cadmium deposits off these parts was quite a task. When an insulating sleeve had to be removed and a new one inserted, we experienced much trouble in removing the shaft. The time required to properly do the job resulted in loss more than time. We enlarged the hole in the contact end of the cylinder through which the shaft extends and inserted a celleron bushing of sufficient diameter to permit the insulating sleeves to pass through. Then we placed a celleron collar on the shaft at the point where the shaft rests upon the cylinder end when in operation. This alteration makes it possible to remove the shaft, replace it with a duplicate shaft, and have the machine in operation again in a very few minutes. We use Arguta bushing for insulating sleeves on the shaft. After a cylinder has been used in a cadmium solution for a year or so there may be some spots upon the exterior of the cylinder

which acquire a deposit of cadmium. These we clean and cover with two or three coats of ordinary chrome rack enamel. It serves the purpose very well if renewed occasionally. I have always considered a shaft extending through a horizontal cylinder less than twenty-eight inches in length, an unnecessary nuisance. Several years ago we were unable to buy cylinders devoid this feature, and we began making them for our nickel-plating machines. Our cylinders are 14″ x 23″, and our average loads weigh from 70 to 100 pounds, and we have experienced no trouble from weakness due to the change. On the other hand, we find the shaftless cylinder an advantage in many respects.

In many emergencies a foreman plater must act quickly, and if he acts wisely in correcting an unwise act, the final result is gratifying. A 150-gallon electro-cleaning solution made from a well known compound required strengthening. There was no cleaning compound in stock except a trial sample of a silicate cleaner which contains approximately 5% of rosin. The product to be cleaned was made of cold rolled steel, and upon the surface of the product there was a film of solder which was due to the use of molten bath of solder. Twenty pounds of the silicate compound was added to the cleaning solution and the solution stirred well. The first batch of work cleaned after this addition excited some suspicion on the part of the operator, and only a few pieces were plated as a test. Peeling was general on every piece plated. Something had to be done and quickly. Fifteen pounds of flake caustic soda was dissolved and added to the bath, the solution was stirred and our trouble was forgotten. I have found caustic soda a truly valuable chemical to keep in stock for emergent needs and quick restoration of sluggish cleaning baths.

During the absence of his foreman, a helper added commercial rock salt to a mechanical plating barrel nickel solution of low metal concentration. Quantity added was undetermined, but the solution became excessively turbid and a yellowish green color. Nickel deposits were very dark and appeared to be merely a film of nickel. Nickel sulphate to the amount of 25% of the total quantity used to prepare the bath originally was dissolved and added, the acidity of the bath was increased and subsequent deposits were splendid. I am positively opposed

to the practice of consigning sick cleaning or plating solutions to the sewer without at least thoughtfully attempting to restore them to a condition of usefulness.

A deeply recessed portion of a sheet steel product always came out of the chromium plating bath with a gas ring around the edge of the recessed section. If the bottom of the recess was daubed with a little aluminum bronze and the bronze allowed to dry, the edges plated perfectly. The adoption of such a preventive method is, however, not as practical as the use of auxiliary anodes extending into the recess.

Scale resulting from carburizing treatment of a small tubular shaped piece which was of larger diameter at one end than the other end, and polished only on the greater diameter, made it difficult to get a satisfactory contact for chromium plating on ordinary racks having spring clip contacts. No descaling treatment was employed. The scale was not objectionable for any other reason, therefore, descaling was not approved. Consequently, we had to solve our own problem. We did it by use of ordinary iron pipe of a diameter suitable to loosely fit the interior of the tubular piece to be plated. The pipe is thirty inches long. One end is reinforced and threaded on a lathe. A solid steel nut two inches square is used on the threaded end of pipe. To the opposite end of pipe is welded a flange three-eighths inch thick by two inches in diameter. Two sides of the flange are cut away, so that the width across is only one inch. Extending upward from the flange is a length of one-half inch copper rod of sufficient length to serve as a means of suspension in the chromium plating bath. Now, to use this holder we place the threaded end up, slip the tubular pieces on it, each with the small end down. Thus, the small end of one piece enters the large end of the piece below it. When the rack is filled, we screw on the nut loosely and place the nut in the channel of one end of a piece of channel bar which is fastened firmly to a work-bench. Then, by aid of a wrench the nut is tightened until the tubular pieces are pressed so tightly together that they cannot be moved with the hand. Naturally, rinsing is more difficult than when the pieces are plated separately, but rejects have been reduced to zero quantity.

In designing and constructing holders for chrome plating we

have found that simple designs and sturdy construction serve us better than complicated designs and equally sturdy construction. For instance, for pieces weighing one-half pound or over, and plated on extended arms, we incline the arms upward at an angle sufficient to increase contact by a sort of pinching effect. This improves contact even when spring loops are employed.

To chromium plate the polished head of a five-sixteenth inch bolt, which is heat treated and pickled and reaches us with surface condition very bad for contact, we use a rack which consists of fifty pieces of three-eighth-inch tubing, which are bent to crescent shape. At a point equally distant from either end, and on the lower side when the crescent-shaped tube is held with ends upward, we drill a quarter-inch hole for draining. The fifty pieces of tubing are soldered on a copper or brass spine or rod with the ends of tubes toward the suspending hook. When a bolt is inserted into the end of a tube it becomes wedged between the curved sides of the tube and can only be released by slightly twisting the bolt. A good contact is obtained.

To nickel-plate the polished heads of these same bolts, we use a rack which consists of a central portion made by soldering wires horizontally and vertically, so that one-half-inch square open spaces are between the wires. The wires are of suitable length to form a central piece for the rack, which is about five inches by ten inches in size. At each of the four corners of this assembly of wires a one-eighth inch wire arm extends at right angles to the face of the wire mesh. The length of these arms depends on the length of the bolts to be plated. The ends of the arms are threaded. To complete the rack, we place a drilled sheet of plain celleron upon the arms by means of holes drilled near the corners of the sheet. A small shoulder of solder holds the celleron at the extreme ends of arms. The celleron is then held against the shoulder by means of a thin celleron nut. Bolts to be plated are inserted through the holes in the celleron and into the square spaces of the wire mesh. With this rack we get a heavy nickel plate on the heads of bolts and avoid plating the threaded end. Since we adopted this rack we have had no complaints from the assembly line regarding tight threads.

When cleaning a tubular piece which is flattened upon a square

perforated steel insert, the small openings at each side of the square inserts often remain closed with dirt. If these tubes are immersed in a dilute sulphuric acid solution, the gas resulting from acid mixing with the alkaline solution forces a stream of hot acid upward and several very narrow escapes by operators resulted. As a safety device we made a simple shield like an inverted letter V, on one side a slot was cut to admit the rack hooks and a hook was fastened to the shield, so that it can be held in the hand with the rack hook. Since this device was adopted for use we have had no trouble. The shield allows the operator to work with a greater degree of confidence and sense of safety.

Did you ever attempt to loosen a screw, and after destroying the head, give it up as a bad job and drill the screw out? When repairing an end of a bakelite barrel which had been used in a cadmium solution about four years, we encountered positive refusal on the part of five slotted flat head 1/4 x 1-1/4 machine screws. We admitted defeat, called in the best machinist in the plant and he had those five screws loose in less time than it takes me to tell of it. Two men, each equipped with a cold chisel and a hammer, stood with the plating barrel between them. A chisel point was placed in each end of the slot in head of screw with chisel at a slant opposite to the lefthand direction of rotation when screw became loose. Then, at a given signal, each man struck their respective chisel a quick blow with the hammer and presto the screw was loose. The shock without a rebound did the trick. Try it sometime, it is a stunt worth remembering.

If you find the electrical current at your chrome tank is insufficient for some jobs, and you have a rheostat in the circuit, try disconnecting the rheostat and run direct from generator to chrome tank. We did that after burning specially constructed by-passes and extra large knife switches to a crisp. Now a $150.00 rheostat serves only as a shelf upon which the operator places his production record pad. The operation of the chrome bath has been simplified, and loss of current through heating of the unnecessary resistance has been eliminated.

A simple counting board for use at the chrome tank is made similar to an ordinary cribbage board.

The supporting arms of a horizontal plating barrel are often discarded because the bearings in which the cylinder shaft revolves, wears ellipitical in shape and possibly entirely through the end of arm. To avoid this excessive wear we equipped our nickel-plating barrels with supporting arms having a cylindrical shaped end three inches in diameter and machined out, so that a bushing with one-half inch wall can be placed in it. When a bearing is observed to be wearing appreciably, we remove the bushing and insert a new one.

Nickel anodes in our plating barrel tanks were rendered useless during a few weeks' use, by reason of excessive disintegration at a point just below the surface of the solution and at the extreme lower end. Regardless of type of solution we employed or strength at which it was maintained, the anodes wore away at the places mentioned. After we had accumulated quite a quantity of stubs, we requested our supply house to cast a curved anode with enlarged diameters at the lower end and near the upper end. We have been using this special shape for several years and find them quite satisfactory when cast free from blow-holes in the enlarged diameters. There is less waste, longer period of usefulness, increased weight, and only one stub instead of two when the useful period is ended.

To expedite removal of oil, dust and grease films from the surface of our rinsing water, we used one-half-inch pipe fastened inside the rinse tank and just above the water level. Small holes drilled along the length of pipe permitted small jets of water to be sprayed along the surface of the rinse water in the tank, when the pipe was connected with the water supply line. Mr. John Feeley of Montreal, came in one day and while looking around the plating room, commented on the idea. Then he told me how he had his rinse water supply line fixed. It was something like this: At the corner of the tank in which the outlet standpipe is located, place the supply pipe and carry it to the bottom of the tank. Place an ell on the lower end, and in it screw a length of pipe long enough to reach about two-thirds the distance across the tank toward the corner diagonally opposite. Flatten the end of this pipe like a fish-tail burner. When the feed valve is opened, the water is forced toward the end of the tank opposite the overflow, rises to the top of tank,

and the surface water flows to the overflow, carrying with it the oil, dust and grease film. This idea makes it easily possible to keep rinse water from fouling as badly as when the spray is used. If it is necessary to use a single compartment of a tank for rinsing from both an acid and a cyanide dip, the rinse water quickly becomes unfit for proper rinsing preparatory to plating. This method of removing the water will facilitate the maintenance of clean water regardless of frequency of immersions or nature of the offending solutions.

In this non-technical paper I have tried to present a few ideas that have been tested and approved. If you are not mechanically inclined, the intention of the writer will count for nought. However, I trust there are some members who may wish to profit by one or more of these simple short cuts to freedom from annoyances indicated by the various items mentioned.

In conclusion, I wish to acknowledge many helpful suggestions by Mr. John Acheson of Toronto Branch, and by Harry Catterall, and George Harris of the C.C.M. plating room staff.

APPRECIATION

We wish to thank the National Officers, Branch Secretaries, Chairmen and Members of Committees, our Advertisers and all who have cooperated with us in making the past year a successful and prosperous one.

Very Truly
W. J. R. KENNEDY,
Executive Secretary

How Zinc Alloy Die Castings *Are* Plated Commercially

By

E. A. ANDERSON[1]

DURING the summer and fall of last year I visited 23 plating plants for the definite purpose of obtaining the fullest details of their plating practice. The particular plants visited were selected with some care in order to include representative concerns of the jobber and production type dealing with all possible phases of die casting uses. The volume of production in these shops was such that it is probable that at least 70 per cent of the industry was represented.

I cannot help but feel proud of the plating industry when I report to you that of the 23 plants approached, all but one freely gave the fullest details of their practice. The one plant was compelled by circumstances beyond their control to refuse permission. This willingness to add their information to a survey of this kind for the ultimate benefit of all platers marks a step forward in an industry which all too often has been accused of being backward and reactionary.

From my own viewpoint, one of the most interesting features of this survey was the discovery of the increasing importance of specification plating in the mind of the plater. Many of the plants visited had no say in the matter but were compelled to supply material to the purchaser's specifications. Others, however, of the jobbing type, were found to have specifications of their own which were set high enough to insure that the purchaser would receive a truly satisfactory plating job. The most interesting features of the plating procedure were, of course, the widespread use of the Rochelle copper solution and of bright nickel plating. Of the plants visited, 78 percent were plating

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copper-bright nickel, while 74 per cent were using the Rochelle-cyanide-copper bath in this sequence. There have been a number of less spectacular but equally important improvements in other parts of the plating practice which are also well worth while.

It may be of interest and value to you to go through the plating cycle and to review what is being done step by step, giving you the highlights of the present-day practice of plating on zinc alloy die castings.

POLISHING—BUFFING—COLORING

There has been a marked and desirable tendency to decrease the amount of polishing done on castings prior to plating. Polishing is done largely on glued buffs or felt wheels revolving at about 8500 linear feet per minute (2300 r.p.m. on a 14-inch wheel). Artificial and Turkish emery are about equally widely used but water soluble glue is practically the only adhesive employed in setting up.

Buffing is done with suitable tripoli abrasive on cloth wheels of a wide variety of stitch patterns. Many special wheels of pocketed types are used. Very little further can be said on this matter since the choice of wheel depends so much on the particular work being handled. Buffing wheels usually revolve at a speed equivalent to 8500 linear feet per minute.

Very little work is subjected to a clear-cut coloring operation. Many plants achieve an equivalent effect by leaving a portion of the buffing wheel free of buffing compound. The idea here is that a touch of the work on this face will wipe off most of the greasy buffing compound. A few plants use a combination cut and color compound.

CLEANING

Solvent cleaning has become a definite part of the plating cycle for zinc alloy die castings. Seventy per cent of the plants visited use some form of solvent cleaning. Seventy-five per

cent of these use trichlorethylene, usually in a three-stage system. In every case alkaline cleaning is used in conjunction with the solvent cleaning.

The wide selection of alkaline cleaners used makes comment on this point impossible. Concentrations of three to six ounces per gallon were encountered and the cleaner temperatures ranged from 150 to 210° F, with 180° F. being the most popular. Sixty-four per cent of the plants visited were using the alkaline cleaning with the work as cathode. Thirteen per cent were making the work exclusively anode, while 23 per cent used a combination in which the current was reversed after a definite interval of time. In the latter cases the ratio of cathodic cleaning time to anodic fell between 4 to 1 and 6 to 1. Only one plant was encountered where alkaline cleaning was accomplished by simple immersion.

Cleaning time, in general, has been reduced to relatively small intervals in recognition of the fact that solvent cleaning removes a considerable burden from the alkaline cleaner. It would be unwise to give cleaning time figures here since this is a matter which varies from plant to plant. I would merely accent the point that overcleaning is a serious source of difficulty in plating and apparently is closely related to the problem of copper blistering.

Steel tanks are universally used and 35 per cent of the platers were found to be using separate steel anodes in order to permit more ready removal of the materials which tend to build up on the anode surface. In most cases the cleaner is changed about once a week. In some plants it is changed as frequently as once a day, while in others it may be used for two weeks before it is dumped.

For several years we have advocated the use of alternate hot and cold rinsing after alkaline cleaning in order to more successfully remove the alkaline material adhering to zinc. This suggestion has fallen on barren ground since most of the plants were found to be using either a single cold rinse or a sequence

of two cold rinses. It is rather interesting, however, to observe the ratio of cleaning tank size to rinse tank size. This varied from 0.4 to 1 to 4 to 1. I am very much afraid that there is still a strong tendency to economize on rinse water at the ultimate expense of trouble in the plating operation. Four platers were found to be using the same rinse tank after both cleaning and acid dipping. No apparent precautions are taken to insure thorough rinsing.

ACID DIP

Forty-three per cent of the platers interviewed are using a sulfuric acid dip ranging from 2 to 10 per cent by volume in concentration. Thirty-five per cent were found to be using hydrochloric acid in a similar range of concentrations, while 17 per cent were using 1 to 2 per cent hydrofluoric acid. One individual was using 5 ounces per gallon of phosphoric acid. In most cases the immersion time is fixed by the first gassing, at which time the work is quickly removed and rinsed. The users of the sulfuric acid dip claim for it, apparently with some logic, that once attack has started it proceeds somewhat more slowly in sulfuric acid than in hydrochloric acid. This permits a greater amount of lee-way in automatic plating units and also reduces to some extent the variations in this operation which hand operation might induce.

COPPER PLATING

You will perhaps be interested in the conditions under which the Rochelle copper solution is being operated today. Each plant, of course, has developed the particular combination of composition and operating conditions which best suits their particular equipment and work. The solutions, however, fall fairly clearly within certain not too wide limits. Copper metal concentrations, for instance, vary from 1.5 to 3 ounces per gallon but the range 1.5 to 2.5 is the most widely preferred. Free cyanide contents have been found ranging from 1/4 to 1 ounce

per gallon. Most platers, however, hold their solutions between 1/4 to 3/4 ounce per gallon.

The widest range of variation exists in the Rochelle salt concentration. Due probably to the fact that adequate analytical methods were not available at the time this survey was made, many platers had no idea how much Rochelle salt was actually in their solutions. Those who attempted some order of control gave concentrations ranging from 4 ounces per gallon to saturation. The general range 6 to 8 ounces per gallon seems to be preferred. Most platers feel that a small amount—say 2 to 4 ounces per gallon—of carbonate is required in a new solution. One or two endeavor to hold the carbonate content to below about 6 ounces per gallon in use, but the majority permit the concentration to vary uncontrolled feeling that drag-out tends to offset the build-up of carbonate in the solution.

In recent years there has been quite a bit of talk about controlling the pH of alkaline plating solutions. I have no information of my own to offer on this particular point, but would merely state that pH determinations were being made regularly in four plants. In one plant the pH was stated to range from 11.3 to 11.7 electrometric, while a second plant gave a figure of 10.4 electrometric, a third plant 13.2 colorimetric, and a fourth plant 12 colorimetric.

Solution temperatures vary in practice from 110 to 180° F. with a preference indicated for the range of 130 to 140° F. Current densities ranged from 20 to 50 amperes per square foot, with a mean value of 25 amperes per square foot. One plant, operating under somewhat special conditions, claims to be using 100 amperes per square foot.

Varied information was obtained on the subject of cathode efficiency. In general, most platers feel that they are operating in one of two efficiency ranges—one around 40 per cent and the other around 70 per cent. From the current density, plating time, and coating thickness figures furnished to me, I attempted to calculate the theoretical thickness on the basis of the claimed

efficiencies. These calculations did not agree at all well with the coating thicknesses which the plater claimed to be producing. In the majority of cases where 70 per cent efficiency was thought to be obtained the actual coating thickness indicated that the 40 per cent figure was probably the more nearly correct.

The matter of agitation of the work in copper plating baths has received some little attention and it is now considered highly desirable that the work should receive a substantial degree of agitation. Agitation speeds ranging from 6 to 16 feet per minute are commercially used.

An attempt was made to obtain sufficient data on which to base some correlation between various factors in the solution operation and the increase or decrease of the copper content in use. Reliable data on anode areas and hence on anode current densities could not be obtained in most instances. From the data available I have not found it possible to explain for any plant why the copper content varies in a particular direction.

Some plants are still using the ordinary cyanide solution without Rochelle salts. The practice in this respect is very similar to that with the Rochelle salt solution excepting that the copper metal content and the free cyanide content of the solution is usually a bit higher than with the Rochelle salt solution and the cathode current density is somewhat lower.

NICKEL PLATING

As you all know, the bright nickel solutions which are so widely used on zinc alloy die castings are all proprietary. It was not within the province of my survey nor of this present talk to discuss these various solutions in any detail. We have tested, in our own laboratories, coatings produced by four of these solutions and have satisfied ourselves that the durability of these bright coatings is, in general, equally as good as can be obtained with equal thicknesses of Watt's nickel. Additional

data along these lines should eventually be forthcoming from the experiments to be carried out by the Joint Committee.

Six plants were encountered who are using the Watt's nickel solution in its original form. The following operating details may be of interest:

Nickel sulfate	25 to 35 oz./gal.
Nickel chloride	3 to 5 oz./gal.
Boric acid	3 to 5 oz./gal.
pH	4.7 to 5.8[1]
Temperature	110 to 120°F.
Current Density	10 to 60 amperes/sq.foot[2]
Agitation	1 to 16 feet per minute

Approximately 50 per cent of the plants visited are plating nickel direct on zinc alloy die castings with the usual sodium sulfate type solution. Nickel sulfate concentrations were found ranging from 10 to 20 ounces per gallon, while the sodium sulfate ranged from 10 to 24 ounces per gallon. It was particularly noticeable among the mid-western platers that 24 ounces per gallon of sodium sulfate was preferred. Ammonium chloride and boric acid both varied from 2 and 4 ounces per gallon. The pH was held within the broad range of 4.8 to 6.2, 5.5 seemingly being the most preferred. Temperatures varied down to 70° F. and up to 95° F. from the preferred figure 80° F. Current densities ranged from 10 to 30 amperes per square foot. It should be pointed out that the plant using a temperature of 95° F. was also using the current density of 30 amperes per square foot.

CHROMIUM

Nothing particularly new or of immediate interest was noted in connection with chromium plating with the exception that full automatic units for applying the entire sequence of coatings, including chromium, have been installed in a few plants.

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[1]Most solutions are operated near the upper limit.
[2]The range 20 to 30 amperes per square foot seems to be preferred.

STRIPPING METHODS

It seems hardly appropriate to turn from a discussion of how coatings are being applied to one of how they may be removed. However, as we all know a certain number of casualties will be found in all plants which are usually stripped and reworked. I am not in favor of this procedure because I have rather definite evidence from a number of plants which shows that the percentage of reworked material which fails to pass final inspection is very much larger than that of new work. Furthermore, we have established in our own tests that the durability of plated coatings applied to stripped castings is definitely poorer than that of similar deposits applied to fresh surfaces. Nevertheless, in spite of all this objection plated castings are being stripped today and you may be interested in how others are doing it.

The removal of chromium from nickel is accomplished by the old procedure of making the work anode in a hot alkaline solution. Cleaning solutions, nickel activating baths, and the like are used by many, but quite a few platers make up a special solution containing 3 to 6 ounces per gallon of sodium hydroxide.

Nickel and copper-nickel are both stripped anodically in sulfuric acid solutions ranging from 50 to 90 per cent in concentration. This work is usually done at full line voltage. The solutions may start cold but heat up fairly rapidly in use. Nickel strips quite rapidly in this type of solution but copper is removed very slowly. Considerable difficulty is encountered in attempting to remove copper by this method because the acid attacks the die casting through pores and thin spots in the copper. Many platers scrap castings on which the copper must be removed, while others polish the copper away when the shape permits it. There is certainly a wide field of use open for a better method of stripping copper.

In closing, I would like to repeat my appreciation of your invitation to talk to you at this meeting and to indicate my willingness to answer, so far as I can, any questions which you may have.

Alkaline Cleaners and Wetting Agents

By FRANK K. SAVAGE
C. G. Conn Ltd.

Read at Chicago Banquet, January 15, 1938

IT is not the purpose of this paper to encourage the preparation of cleaners in the plating field. There are many very fine prepared cleaners on the market resulting from years of observation and research, which will meet any basis metal cleaning requirement. However, due to a very special set of circumstances at our plant, a careful study of cleaners has been made over a period of years with the result that we do now prepare all our own cleaners, designed particularly for our own various needs.

It is a fact that up until very recently, and even now, the cleaning line in a plating plant is too often neglected. The present trend in nickel plating toward bright deposits and the increased demand upon the plating foreman for superior work, necessitates an increased knowledge of every phase of cleaner preparation and operation. It is not only interesting but desirable to know something of the reactions of each ingredient.

There are many compounds which are incorporated in the preparation of alkaline cleaners. These logically fall in three general groups. The first group is the soluble inorganic alkalies, such as sodium hydroxide, sodium carbonate, sodium bicarbonate, sodium sesquicarbonate, sodium tetra borate, di sodium phosphate, tri sodium phosphate, sodium meta borate, sodium aluminate, sodium cyanide, and various of the sodium silicates. Mixed and double salts of the above compounds are also used such as the one listed, sodium sesquicarbonate, which is a molecule of sodium bicarbonate combined with a molecule of sodium carbonate and containing two molecules of water of crystallization. The second group is insoluble inorganic substances such as silica and insoluble silicates. The third group is the organic compounds which may be one or more of the following: soaps of fatty acids such as sodium, potassium and

ammonium stearate, oleate and palmitate, rosin soaps, amino acids, starches and sulfonated alcohols.

The above substances, and some others, when compounded in the proper proportions for any one cleaning job will produce, when the resultant solution is introduced into the cleaning line, the chemically clean surface necessary for a satisfactory electro deposit. The first group of compounds named, the soluble inorganic alkalies, furnishes the alkaline cleaner with positive and negative ions necessary for the passage of an electric current. This current deposits large quantities of hydrogen on the work surface, if the cleaner is cathodic, which tears and pries the grease and dirt off mechanically. The alkaline characteristics of these compounds attack the saponifiable oils and fats such as oleic acid according to the following equation:

$$\underset{\text{free fat}\\\text{insoluble}}{C_{17}H_{35}COOH} + \underset{\text{caustic}}{NaOH} \longrightarrow \underset{\text{soap}\\\text{soluble}}{C_{17}H_{35}COONa} + H_2O$$

forming soluble soaps. The degree of alkalinity should be controlled closer than many of us realize for maximum cleaning efficiency. The alkalinity must be low enough so that the basis metal being cleaned is not appreciably attacked or tarnished during the cleaning cycle. It has been found that zinc and aluminum are attacked rapidly above a pH of 10; tin above a pH of 11; brass above a pH of from 12 to 12.5, depending upon the composition; and that iron high in silicon may be pitted above a pH of 13. It is desirable, however, to keep the alkalinity at the highest practical point in order to get maximum detergent action. As the caustic alkalinity is dissipated in a properly prepared cleaner, more is formed due to the hydrolysis of some of the inorganic salts as shown by the following equation:

$$Na_3PO_4 + H_2O \longrightarrow NaOH + Na_2HPO_4$$

These salts of a strong alkali and a weak acid act in much the same way in a cleaner as boric acid and its sodium salt do in regulating the acidity of a nickel plating solution. The life of the cleaner is greatly prolonged in this way. Acid salts may be used to reverse the above reaction when the cleaner attacks the basis metal too rapidly. The second group of compounds, the insoluble inorganics, have been added to cleaners, sometimes as fillers, and sometimes for the honest purpose of scouring the

metal surface by abrasion. As stated in paper by Walter Meyer, these compounds probably do little good, due to the fact that a heavy enough particle to do any practical scouring, would immediately settle to the bottom of the tank. Particles light enough to remain suspended are too light to accomplish the purpose. The third group of compounds, the organic compounds such as soaps and similar products, probably does not exist in true solution, but in colloidal dispersion, that is, they exist in particles consisting of aggregates of molecules which are small enough to remain suspended indefinitely, but are large enough to be retained by some filters or membranes. A particle size of from 1 to 200 millimicrons in diameter is normally called the colloidal range. One millimicron is one millionth of a millimeter. These colloidal particles or flocks, have tremendous surfaces with the interfacial property of adsorbing oils which are not saponifiable. This property allows the cleaner to wet the surface of the work being cleaned much more rapidly than if the colloids were not present. Soaps in alkaline cleaners, both those intentionally added, and those formed by the saponification of vegetable and animal oils and fats in the actual cleaning process under the proper conditions, give satisfactory results.

Soaps, however, have several serious drawbacks. When work is removed from a cleaner it is usually immersed in a cold water rinse. In some sections of the country the water is very hard containing comparatively large amounts of calcium and magnesium compounds. When the soap solution on the work comes in contact with these compounds, insoluble calcium and magnesium soaps are formed leaving a film on the work. This film is particularly insidious because it may not be visually apparent either from surface breaks or discoloration as the work comes from the rinse. However, the subsequent acid dip changes the insoluble soaps to free fat, the corresponding fatty acid, and surface breaks are immediately apparent. If this condition is not particularly serious, the subsequent cyanide copper strike, if one is used, may resaponify and remove the film. It is much more desirable not to have a set of conditions that produces such a film than it is to worry about removing it. This led us to the investigation of sulfonated oils. These products are generally known to the plating industry as wetting

agents because they wet the surface by lowering the interfacial surface tension. This series of organic compounds is prepared by the hydrogenation of fatty acids, which changes them to fatty alcohols. A subsequent treatment with sulphuric acid introduces a sulphonic group which adds to the solubility of the resultant compound. Our laboratory tests proved to us that the compound decided upon for our use, was extremely free rinsing, did not react with calcium or magnesium to form insoluble compounds, and that very small amounts decreased the surface tension to a remarkable degree. The compound was then incorporated in one of our cleaning tanks in the proportion of about one tenth of one percent of the weight of the soluble salts. A close observation of the subsequent cleaning of brass and steel convinced us that the results were even better than anticipated. It was found that the alkalinity could vary over wider limits and still give as good, or better, cleaning action than previously. It is very desirable when incorporating any product or chemical in plating room processing, or any processing, to devise or develop some means of testing its action or analyzing for its actual concentration. After the adoption of this compound for use in our cleaning tanks we naturally wished to have some rapid means of at least testing its action to add to our routine alkalinity titrations, specific gravity readings and pH determinations. It seemed to us that any actual analysis would be too long involved, and perhaps impossible, as we did not even know the exact composition of this particular wetting agent. We reasoned, however, that as long as the wetting power of a solution is a function of its surface tension, some means of testing the surface tension should be adequate. We finally decided upon a very simple and rapid test. One method of testing surface tension in physical chemical research is by the dropping method, that is, by measuring the volume of a drop that falls from the tip of known area at known temperature. It was a crude application of this method that we chose. We selected a 50cc burette which had a perfect tip and always use this burette for surface tension determinations, thus eliminating any variation due to tip area. The burette is filled with the cleaning solution which has been previously cooled to approximately room temperature. The solution is then allowed to drop at the rate of two cc per minute. The number of drops over a two cc range

are counted. This number we empirically called the surface tension index, and so record it on our cleaning tank records. It was found that the surface tension index of our cleaners without wetting agent was between 55 and 60. By the trial and error method it was found that the cleaners performed very satisfactorily at a S.T.I. of 85-90, and are so maintained.

In running the tests, every effort is made to adhere as closely as possible to the standards set up and thus minimize error. A raise in temperature raises the S.T.I. If the drops fall faster than 2cc per minute, there is a decrease in the S.T.I. The actual surface tension is a function of the reciprocal of the S.T.I., as it decreases as the S.T.I. increases.

This test is not presented as a great piece of research, the idea was even obtained from a fellow member. It is only to show that very often by simple tests, solution control may be had, thereby taking the guess work out of one more variable in plating room processing.

We have also used sulphonated alcohol very successfully as a soap substitute in ball burnishing. With the use of soap we encountered the same trouble as in cleaners. Due to the formation of insoluble gummy soaps in our burnishing barrels, the balls and work became coated with a dull film which was very difficult to remove. This necessitated cleaning that further dulled the surface and led to excessive burnishing after plating. Trouble was also encountered with peeling of the plate whenever the film was not completely removed. The pickling tank became covered with a fatty acid or grease film which was picked up by work entering it. We were aware that there are soaps and soap products on the market that have efficient lubricating action and do not have so great a tendency to form insidious films in even very hard water. As long as a sulphonated alcohol was already incorporated in our cleaning line, we tried it as a ball burnishing lubricant. The results were gratifying and surprising. A rich foamy suds was formed, the work came from the burnishing barrel without a film, very bright, and so clean that very little subsequent cleaning was necessary. It has been noticed, however, that the wetting agent does not have as good a lubricating action as soap, particularly where the work being ball burnished consists of rather heavy cross-sections.

In conclusion, I wish to place emphasis upon the following

points. First, the alkaline cleaner used on any cleaning job should be properly compounded to give a predetermined pH value. Second, the cleaner should contain the proper concentration of alkaline salts to maintain this pH value as long as possible. Third, the most successful cleaning of one metal may not be possible in a cleaner designed primarily for another metal. Fourth, the use of wetting agents in cleaners increases the speed, efficiency, and free rinsing characteristics of cleaners without the undesirable properties of soaps. Fifth, the use of wetting agents in ball burnishing may be desirable with light work, particularly if very hard water is used. Sixth, as close control should be maintained on cleaners as plating solutions as to pH, alkalinity, surface tension, and emulsifying power.

Gavin J. Tyndall

Gavin J. Tyndall, 57, of Attleboro, vice-president, secretary and director of the George L. Claflin Company, who was widely known in Rhode Island, died recently, after a short illness, in Massachusetts General Hospital, Boston.

Mr. Tyndall was a registered pharmacist here, a member of the Rhode Island Pharmaceutical Association, of the Rhode Island Travelling Men's Auxiliary, the American Electro-Platers' Society (Providence-Attleboro Branch), and of the corporation of the Rhode Island College of Pharmacy and Allied Sciences.

Mr. Tyndall was born in Hyde Park, Vt., Oct. 25, 1880, the son of John and Mary Tyndall, and obtained his early schooling at the People's Academy, Morrisville, Vt. Later he attended Albany Business College at Albany, N. Y., and while there worked for the New York Central Railroad Company in the train dispatcher's department. After a period of several years he moved to Schenectady, N. Y., where he worked for the General Electric Company, leaving them to take up his residence at Attleboro.

Shortly after going to Attleboro he was employed by the A. S. Ingraham Company, leaving them in the fall of 1910 to assume management of the Attleboro Industrial Branch of the George L. Claflin Company. He was successively manager of the branch, assistant secretary, secretary and finally vice-president, secretary and director during the last ten years. He was also an official in the affiliated companies.

He was married August 13, 1913, to Olive Hinds of Attleboro, who, with one son, Bradford E. Tyndall, survive him. He is also survived by his father, John Tyndall; four sisters, the Misses Grace and Winifred Tyndall of Morrisville, Vt.; Mrs. Kathryn Moore of Rochester, N. Y., and Mrs. Nellie Goodrich of Hanover, N. H., and by three brothers, John N. Tyndall of Attleboro, Mass.; James Tyndall of Bellingham, Mass., and Karl Tyndall of Morrisville, Vt.

Mr. Tyndall was a member of the Attleboro Chamber of Commerce and a director of the Attleboro Y. M. C. A. for many years. He had also served on various Attleboro community committees. He served six years on the merchandising committee of the Druggists' Supply Corporation of New York, a national organization of which his firm was a member, and at the time of his death had been secretary of the New England Drug Exchange for many years.

The funeral was held from Stone's Funeral Home, 44 Dean street, Attleboro. Burial was at Attleboro.

OFFICIAL PROGRAM

THE TWENTY-SIXTH ANNUAL CONVENTION OF THE A. E. S.

MILWAUKEE, WISCONSIN, JUNE 13th, 14th, 15th, and 16th, 1938.
HEADQUARTERS, HOTEL SCHROEDER

SUNDAY AFTERNOON, JUNE 12th

2:00 p.m. Final Meeting of Committee Chairmen.

3:00 p.m. REGISTRATION, Hotel Schroeder.
Registration fees: Men $6, Ladies $4, which entitles registrant to Book of Tickets to be used for all functions and activities. Membership in Society is not necessary for registration.

MONDAY MORNING, JUNE 13th

8:00 a.m. REGISTRATION, Hotel Schroeder.

9:00 a.m. WELCOME TO DELEGATES, MEMBERS AND VISITORS.
R. M. Goodsell, General Chairman.

WELCOME TO MILWAUKEE
Mayor Daniel Hoan or his representative.

PRESIDENTIAL ADDRESS
President A. B. Wilson.

BUSINESS SESSION:
Presentation of Credentials.
Submission of Amendments to Constitution.

MONDAY AFTERNOON, JUNE 13th

1:30 p.m. EDUCATIONAL SESSION:
Geo. Hogaboom, Chairman, (Hanson-Van Winkle-Munning Co.)

1. Summary of Research on Electrodeposition at the National Bureau of Standards:
   Dr. Wm. Blum, U. S. Bureau of Standards.
2. Preparation of Specimens for Exposure Tests:
   P. W. C. Strausser, Research Associate of the A. E. S.
3. Primary Current Distribution in Electrodeposition in Liniar, Cylindrical, and Spherical Conductors:
   C. Kasper, Bureau of Standards.
4. Survey of Metal Cleaning:
   Dayton Branch.
5. Advancements in Electroplating in a Lifetime:
   Boston Branch, Bert Sage, (A. S. Campbell Co.)
6. Practical Demonstration of What Happens in a Plating Barrel:
   Dr. Burton G. Daw, Lasalco, Inc., St. Louis.

MONDAY EVENING, JUNE 13th

8:30 p.m. INTERNATIONAL FELLOWSHIP CLUB—OPEN HOUSE

Crystal Ball Room—Hotel Schroeder.

This night will be devoted to a party for men and ladies sponsored by International Fellowship Club. We look forward to the pleasure of entertaining you. We welcome you as our guest. A ticket is included in the book of tickets which must be used for admittance to this affair. A night of entertainment, dancing and refreshments.

TUESDAY MORNING, JUNE 14th

8:30 a.m. EDUCATIONAL SESSION

Wm. Phillips, Chairman (General Motors Corp.)

1. Physical Properties and Uses of Heavy Nickel Deposits: *W. A. Wesley*, International Nickel Co.
2. Bright Nickel: *G. Soderberg*, Technical Director, The Udylite Co., Detroit, Michigan.
3. Importance of Correct Anode Corrosion in Nickel Plating: *W. Pinner* and *E. Borchardt*, General Spring & Bumper Co., Detroit, Michigan.
4. Investigations in Bright Zinc: *New York Branch, Dr. C. B. F. Young*, Columbia University.

TUESDAY AFTERNOON, JUNE 14th

12:30 p.m. Board Cars for Waukesha Beach—Picnic.
Cars leave promptly at T. M. E. R. & L. Bldg., 2nd and Michigan Streets.

1:30 p.m. Dinner—Waukesha Beach Dining Room.

2 30 p.m. Ball Game. East *vs.* West.

5 30 p.m. Cars leave for Milwaukee.

TUESDAY EVENING, JUNE 14th

8:30 p.m. EDUCATIONAL SESSION

T. F. Slattery, Chairman (Bureau of Engraving & Printing).

1. Answers to 101 Questions on Copper Plating: *Springfield Branch.*
2. The Effects of Metallic Impurities on the Structure of Cyanide Copper Deposits: *Dr. Walter R. Meyer*, Electro-Chemist, General Electric Co., Bridgeport, Conn.
3. High Speed-High Temperature Copper Plating Solutions: *Floyd Oplinger*, E. I. DuPont de Nemours, Wilmington, Del.
4. Cyanide Copper Bath—Rochelle Salt: *Robert Wagner*, Guide Lamp Div., General Motors Corp., Anderson, Ind.

WEDNESDAY MORNING, JUNE 15th

8:30 a.m. PLANT VISITATION

1. National Plating Co., 325 N. 8th Street.
2. S. K. Williams Co., 2370 N. 32nd Street.
3. Cutler-Hammer Inc., 13th & St. Paul Avenue.

WEDNESDAY AFTERNOON, JUNE 15th

1:30 p.m. EDUCATIONAL SESSION
Dr. Wm. Blum, Chairman (Bureau of Standards).

1. Dips and Their Uses in the Plating Cycle:
   Hartford Branch.
2. Metal Coloring:
   Geo. Hogaboom, Hanson-Van Winkle-Munning Co., Matawan, N. J.
3. Effect of Carbonate and Sulphate on Cyanide Plating Solutions:
   R. O. Hull, Grasselli Chemical Co.
4. Electroplating Solves Manufacturing Problems:
   Detroit Branch, J. H. Hoefer, A. T. Wagner Co.

WEDNESDAY EVENING, JUNE 15th

8:00 p.m. EDUCATIONAL SESSION
Oscar Servis, Chairman, (Felton-Tarrant Co.)

1. Wetting Agents in Plating Solutions:
   Newark Branch.
2. Industrial Finish Manufacture:
   E. Bucy, Zapon-Brevolite Div., Atlas Powder Co.
3. Use of Solvent Emulsions in Cleaning:
   Dr. Mitchell, Technical Director, Magnus Chemical Co., Garwood, N, J.
4. Fume Exhaust Design:
   Toronto Branch, H. A. Smith, Coulter Copper & Brass Co.
5. Practical Solution Maintenance:
   Philadelphia Branch, Frederick Fulforth.
6. Matt and Bright Dipping:
   Waterbury Branch.

THURSDAY MORNING, JUNE 16th

8:00 a.m. SPECIAL BUSINESS SESSION
Constitutional Revision.

THURSDAY AFTERNOON, JUNE 16th

1:30 p.m. FINAL BUSINESS SESSION
Election of officers.
Selection of Convention City.

THURSDAY EVENING, JUNE 16th

6:30 p.m. BANQUET AND DANCE
Hotel Schroeder Ball Room—Informal.
Entertainment. Fun for all.

SPECIAL ATTENTION

Due to the extra session for the revision of the Constitution, the Committee wishes to announce that all sessions will start promptly on schedule. In order to complete our entire program this will be necessary. We therefore request your co-operation in this matter.

EXHIBITS

A complete list of exhibits up-to-date:

Chicago Branch

C. G. Conn, Ltd.	Elkhart, Ind.
McGill Mfg. Company	Valparaiso, Ind.
Katzinger Company	Chicago, Ill.
Gilbertson & Son	Chicago, Ill.
Appolo Metal Works	Chicago, Ill.

Toledo Branch

Hale Chrome Products Company	Air-Way Company
Acme Specialty Mfg. Company	Jas. E. Nagle & Sons, Inc.
DiSalle Plating Company	Moore Chrome Products Company
DeVilbiss Company	Hinkle-Clause Company
Gordon Bumper Company	Gerity Adrian Corp.
Shaaf & Goode Company	Dura Company

Grand Rapids Branch

Zeeland Ornamental Company,	Zeeland, Michigan
Keeler Brass Company,	Grand Rapids, Michigan
Shakespeare Company,	Kalamazoo, Michigan
American Brass Goods,	Grand Rapids, Michigan
Grand Rapids Store Equipment Co.,	Grand Rapids, Michigan
Grand Rapids Metal Craft Corp.,	Grand Rapids, Michigan
C. L. Frost & Son Company,	Grand Rapids, Michigan
W. B. Jarvis Company,	Grand Rapids, Michigan
Grand Haven Novelty Company,	Grand Haven, Michigan
Knapt & Vogt Mfg. Company,	Grand Rapids, Michigan
Hart & Cooley Mfg. Company,	Holland, Michigan

Cleveland Branch

The Republic Steel Corp.,	Cleveland, Ohio
The National Screw & Mfg. Co.,	Cleveland, Ohio

St. Louis Branch

Knapp-Monarch Company,	St. Louis, Missouri

Buffalo Branch

Trico Products Company,	Buffalo, N. Y.
J. H. Williams & Company,	Buffalo, N. Y.
Barcals Mfg. Company,	Buffalo, N. Y.
Spencer Lens Company,	Buffalo, N. Y.
Rudolph Wurlitzer,	Tonawanda, N. Y.
Geo. A. Ray Mfg. Company,	Buffalo, N. Y.

Milwaukee Branch

Milwaukee Stamping Company,	Milwaukee, Wisconsin
Kohler Plumbing Company,	Kohler, Wisconsin
Cutler-Hammer, Inc.,	Milwaukee, Wisconsin
Racine Plating Company,	Racine, Wisconsin
Moe-Bridges Lamp Company,	Milwaukee, Wisconsin

Branches

Toronto Branch	Anderson Branch
Newark Branch	Los Angeles Branch
New York Branch	Detroit Branch
Bridgeport Branch	

LADIES' PROGRAM

Sunday, June 12th

2:30 p.m. REGISTRATION.

Monday, June 13th

Morning Open.
Afternoon A Tour of Milwaukee and its points of interest.
Evening Accompanying the men as guests of the International Fellowship Club Party.

Tuesday, June 14th

Morning Open.
Afternoon Accompanying the men to the picnic to be held at Waukesha Beach.
Evening Card Party at 8:30 p.m.

Wednesday, June 15th

Morning Open.
Afternoon A Visit to the Phoenix Hosiery Co.
Evening Theatre Party.

Thursday, June 16th

Morning Open.
Afternoon Bingo Party sponsored by the International Fellowship Club.
Evening Accompanying the men to the BANQUET.

General Chairman

Mrs. Jack Geissman

Mrs. Robert Steurnagel	Mrs. R. M. Goodsell	Mrs. Al Hermansen
Mrs. Dexter Rhodes	Mrs. Phil Ritzenthaler	Mrs. Wm. Geissman
Mrs. Roman Lipinsky	Mrs. Jos. Bykowski	Mrs. Dan Wittig
Mrs. Frank Marx	Mrs. M. McGuire	Mrs. Harry Unke
Mrs. Harry Bornitzke	Mrs. Rodney Olson	Mrs. Robert Goodsell
Mrs. Robert Steurnagel, Jr.		

INTERNATIONAL FELLOWSHIP CLUB

The International Fellowship Club, will, as usual, hold a full schedule of meetings during the convention. On Monday noon June 13th, the Annual Luncheon will be held at the Hotel Schroeder. All men interested in electroplating equipment and supplies are invited to be present. On Monday evening June 13th, the Annual Open House, given by the Fellowship Club will be held at the Hotel Schroeder. All registrants at the Convention are invited. On Thursday afternoon at the Schroeder Hotel will be held a party for the ladies, consisting of games and other entertainment. Prizes will be awarded.

Arrangements have been made for any of the registrants who may be interested, to play golf at any time during the convention week. For information communicate with

TOM TRUMBOUR
JACK GEISSMAN

Business and Social News

BRANCH NEWS

Educational Activities

WATERBURY BRANCH

Twenty-nine members were present at our May meeting to hear Mr. Bucey of the Zapon Company talk on "New Developments in Lacquers." He spoke particularly on the Urea Formaldehyde Lacquers. Questions and discussions on the subject continued long after he had finished his formal talk. The Branch felt well repaid for hearing Mr. Bucey.

Officers for the coming year were elected as follows: *President*, Mr. Lougi; *Vice-President*, Mr. Coleman; *Secretary-Treasurer*, Mr. Candee; *Librarian*, Mr. Couch; *Board of Managers*, Messrs, Crane, Mahlsted and Geo. Muscio. The slate of officers was elected unanimously.

Delegates to the Convention were appointed as follows: *Delegates*, Mr. Gray, Mr. McConas, Mr. Candee; *Alternates*, Mr. Elwin, Mr. Marland, Mr. Prescott.

After the meeting was over the committee for the branch paper went over the material to be presented at the Milwaukee Convention for the final time to make sure that it was in good order for presentation. Mr. George Muscio has ably edited the material submitted and the paper will be an excellent one.

E. T. CANDEE, *Sec.-Treas.*

HARTFORD BRANCH

The Hartford Branch of the A.E.S. held its May meeting on Monday evening, May 23, 1938, at the Elk's Club, Bristol, Conn.

The meeting was called to order at 8:30 p.m. with President Pietro in the chair. Minutes of the previous meeting were read and accepted. All communications were read and placed on file. All bills were voted paid.

At this meeting, election of officers for the coming year took place; also election of delegates and alternates to the National Convention.

After all business had been transacted, and all letters discussed, the balance of the evening was spent in the final reading and discussion of our Branch paper to be read at the National Convention.

Delegates were duly instructed as to how to vote on the issues to come up at the Convention.

The officers and chairmen of the various committees were given a rising vote of thanks for their cooperation during the year.

The meeting was attended by sixteen members and was adjourned at 11:00 p.m.

V. E. GRANT, *Sec.*

SPRINGFIELD BRANCH

The regular monthly meeting of the Springfield Branch, A.E.S., was held Monday evening, May 23, 1938, at the Hotel Charles, with President Barrus in the chair.

Two applications were read and elected to membership.

It was voted that the chair appoint a committee of three to investigate the discrimination of platers in this territory. This committee will consist of Mr. Kennedy, Mr. Murray, and Mr. Prouty.

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Please mention THE MONTHLY REVIEW *when writing*

A paper with the answers to 101 questions on copper plating, that was prepared for the Convention, was read by Mr. Phillip Prouty, who acted as chairman of the committee writing this paper. These members were given a vote of thanks.

Refreshments were served by Mr. Costigan and Mr. Hastie, after which the meeting adjourned at 10:50 p.m.

HENRY R. DELARM, *Sec.*

NEWARK BRANCH

The regular meeting of the Newark Branch A.E.S. was held on Friday evening May 6, 1938, at the Club Room of the Hotel Douglas, Newark, N. J.

The meeting was called to order at 8:45 p.m. by Mr. Philip Sievering, president pro-tem. The following officers were present: George Klink, president; George Wagner, secretary; Nelson Sievering, treasurer; Paul Oldam, librarian; Roy Stout, sargeant-at-arms; Samuel Taylor, Samuel Glickenhaus and Thomas Haddow, trustees.

The minutes of the previous meeting were read and approved. The following communications were read: A letter from Mr. A. J. Hermansen, secretary of the Milwaukee Branch; a letter from Mr. R. M. Goodsell, General Chairman of the Milwaukee Convention; a letter from Mr. A. B. Wilson, Supreme President; a letter from Mr. Wm. J. R. Kennedy, Executive Secretary.

An invoice for the fourth quarter per capita tax was voted to be paid. Mr. Vincent Pellagrino was elected to active membership and Mr. Walter Ray Lockwood was elected to associate membership. A request for a transfer from Newark Branch to New York Branch was granted to Mr. Nathan Sorenson.

Mr. Wagner, chairman of the banquet committee, reported that the banquet was a success both socially and financially. He stated that a complete report would be ready at the next meeting.

Mr. Horace Smith proposed a joint banquet between Newark Branch and New York Branch for the coming year. This caused quite a discussion after which Mr. Smith, Mr. Wagner and Mr. Shamis were appointed as a committee to visit New York Branch at their next meeting to put the proposition to them.

Mr. Smith spoke next on the 1939 Convention and invited his committee to accompany him to Convention Hall at Asbury Park on Saturday May 14th.

Mr. Oldam stated that the paper on "Wetting Agents" for the Milwaukee Convention was nearly completed and that the Committee on this paper would have their final meeting on May 20th at 6 p.m. at the Hotel Douglas.

Mr. Nelson Sievering was appointed to present this paper at the Convention.

Mr. Oldam then read a letter from Mr. Fletcher asking for exhibits to the Milwaukee Convention. Mr. Philip Sievering and Mr. John Kotches promised to have their exhibits ready for shipment in due time. Meeting adjourned at 11 p.m.

GEORGE WAGNER, *Sec.*

CLEVELAND BRANCH

The regular monthly meeting of the Cleveland Branch of the A.E.S. was held Saturday, May 7, 1938, at Hotel Cleveland. The meeting was called to order by our President, Mr. Scott, at 8:15 o'clock.

Mr. Harold Seitz of the Hodell Chain Co., of Cleveland, Ohio, was elected an active member of the Cleveland Branch. There were no applications. Mr. Bernard Case asked for a transfer to Bridgeport Branch.

Bills were ordered paid.

The Committee for the Dinner Dance reported a slight loss.

The following members were elected as officers of the Cleveland Branch:

Mr. Fred Matts, *President*; Mr. Fred Carlson, *Vice-President*; Mr. Chas. F. Ott, *Secretary-Treasurer*; Frank Truden, *Librarian*. Mr. J. Singler, Mr. R. Lyons, Mr. T. O'Conners, *Board of Managers*.

Meeting adjourned at 10 o'clock.

CHARLES F. OTT, *Sec.*

BINGHAMTON-ELMIRA BRANCH

Binghamton-Elmira Branch had one of the best meetings of the season which was held at the Cortland Hotel, Cortland, N. Y., May 6. The speaker was Mr. Bert Sage, superintendent of finishing at the A. S. Campbell Co., Boston. He is Librarian of the Boston Branch A.E.S.; also a member of the Research Committee. His subject was "Bright Nickel Plating."

Mr. Sage is one of the pioneers in this field of plating, having been in production on bright nickel for the past 2 or 3 years. He pointed out and stressed the importance of the preparatory work and dips before plating. He had some samples of his parts taken from production line and they were equally as good as buffed nickel.

Mr. Sage also spoke of the work being done by the Research Committee and made an appeal for a cooperative effort through our section for funds to carry on the work. We are planning to do something about this at our next meeting.

This meeting was truly a discussion meeting and the speaker was kept busy answering questions for two hours.

The talk was purely extemporaneous and other branches would do well to contact Mr. Sage for next season.

We also had with us Mr. Burton Daw of the St. Louis Branch who is always welcome.

Adjournment at midnight until the fall.

GEORGE SIMMONS.

CHICAGO BRANCH

The regular monthly meeting of Chicago Branch was held May 14, 1938, at the Atlantic Hotel.

President E. Stepka presided and all other officers were present.

I am sorry to again report the death of one of our members, Mr. W. Rauen. Chicago Branch officers and members extend to the family of Mr. Rauen their deepest sympathy.

An invitation from Milwaukee

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Branch to all our members read and placed on file. Let's all plan to attend this Convention and show the Milwaukee Branch what a real Chicago crowd looks like.

A questionaire on the new proposed revision of the Constitution received from the executive secretary, Mr. Kennedy, read and referred to the Delegates.

The financial report of the fiscal year read by the Secretary-Treasurer, and accepted as read.

The following officers were elected for the coming year: *President*, J. W. Hanlon; *Vice-President*, G. Holmgrem; *Secretary-Treasurer*, M. H. Longfield, *Board of Managers*, E. A. Lanz, C. Kocour, J. L. Nowak. Delegates to Milwaukee Convention, F. J. Hanlon, H. A. Gilbertson, J. W. Hanlon; alternates, E. A. Lanz, M. H. Longfield, and E. Stepka.

A very interesting talk on the rubber lining of tanks was made by Mr. R. Johnson of the Collord Corp. of Detroit. Mr. Johnson had his subject well in hand and answered the many questions asked by the members and showed quite a large number of samples of rubber in various forms.

As the hour was late it was voted to omit the question box for this meeting.

J. W. HANLON, *Sec.*

ROCHESTER BRANCH

On Friday night April 22, the Rochester Branch held its regular monthly meeting at the Seneca Hotel. Regular business was transacted during which Mr. Floyd Erlenmeyer, 253 Alexander St., Rochester, N. Y., was elected as an associate member and the following names were ordered published: Mr. Eugene Paul Swartz, associate; Mr. Kenneth C. Merrill, associate; and Dr. Linus M. Webb, associate. The meeting was then turned over to a discussion of progress on the annual meeting to be held on the 30th. The meeting was then adjourned.

JUDSON R. ELSTER, *Sec.*

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TOLEDO BRANCH

A meeting of the Toledo Branch A.E.S. was held May 5th at the country home of Mr. Spanolis with 18 members and 4 visitors present. We were honored on this occasion by the presence of our genial National President, Mr. A. B. Wilson, who drove over from Detroit with peddler Mose Cherry of the Hanson-Van Winkle-Munning Co., to give our Branch the once over and to help us celebrate the closing of the fiscal year. The meeting was called to order by President Moore. The minutes of the previous meeting were read and approved. Bills were ordered paid. A communication from the Binghamton-Elmira Branch was read and placed on file. Next in order of business was the election of officers for the new year and the selecting of delegates for the Milwaukee Convention. The minutes of the last annual meeting were then read and approved. Balloting for the various offices then took place, and the following elected:

President, Stanley Moore; *Vice-president*, Herbert Willis; *Secretary*, Gaston Bergeman; *Treasurer*, Edward St. Armand; *Librarian*, James Lee; *Board of Managers*, James Nagle, Wm. Hunlock, and Carlton Mitchell. Delegates, James Lee, Herbert Willis, Walter Weiker; alternates, James Nagle, Robert Hilfinger, Stanley Moore.

After the election of officers, President Moore introduced Mr. Wilson, who responded by giving a splendid talk on the revision of the Constitution and its By-Laws, after which he answered all questions put to him by those present. "Come and visit us again soon, Mr. President; you have a standing invitation here."

Sound motion pictures through the courtesy of the Chevrolet Motor Co., were then shown after which the refreshments followed and the meeting adjourned.

WALTER W. WEIKER, *Sec.*

BOSTON BRANCH

Boston Branch met Thursday, May 19th, at the Bradford Hotel, Boston, with President Mintie in the chair.

The minutes of the previous meeting were read and approved.

Communications were read. The letter on the Constitution and By-Laws was taken up later, others placed on file. Bills were ordered paid.

Report was made by Bert Sage on the work being done by the Research Committee on trying to protect the plating business from the poor quality of work now on the market.

A motion was made that Boston Branch donate $50.00 to the Research Fund to continue the good work being done. Let the other branches do what they can to keep this great work going.

A motion was made that the Branch appoint a committee to make arrangements for our annual picnic, the following being appointed: Al. Baker, Chairman; Arthur Colling, Bill Treadwell, Bert Sage, Joe Barron, Edward DeLorme, Bill Jones, Harry Lack, Al Chabot, and A. W. Garrett. They will meet later.

A motion was made that the Branch meet once a month starting next fall and will try to find new quarters to meet in.

Cut plating time 50% . . . better results

A large manufacturer was experiencing trouble removing stamping oil from brass cups before cadmium plating. A 20-minute plating would not thoroughly cover the insides of the cups.

The cups, now cleaned with MAGNUS 94XX for 1½ minutes and barrel plated with cadmium for 10 minutes, have a good covering of cadmium on the inside as well as the outside.

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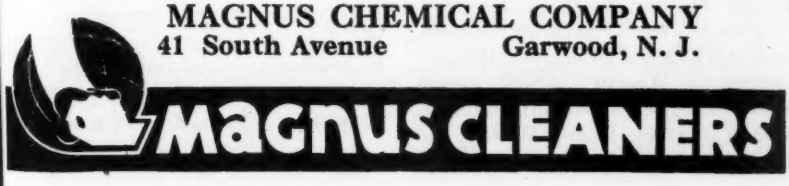

The following were elected to office for the coming year: *President*, Edward C. DeLorme; *Vice-president*, Bert W. Sage; *Secretary-treasurer*, A. W. Garrett; *Sergeant-at-arms*, George Loeser; *Librarian*, Arthur J. Mintie; *Board of Managers*, Chairman, Charles O. Hardy, Harry J. Lack, and William Jones.

We had with us the Executive Secretary, Bill Kennedy, and he had the honor of installing the new officers for the coming year and he did a fine job. Thanks, Bill.

Under our new officers the report of the committee on the Constitution and By-Laws was taken up. All were agreed upon but two of the articles—the first, the question of per capita tax and the question of active membership. These were left open for the Convention. Bill Kennedy spoke on this per capita tax and gave the members some important information on the reason for wanting to raise the per capita tax—so the delegates will take it up at the Convention in June.

The meeting adjourned at 10:30 p.m.

A. W. GARRETT, *Sec.*

GRAND RAPIDS BRANCH

Grand Rapids Branch held its last regular meeting May 12, 1938, President Homer Morton presiding. The minutes of the previous meeting were read and approved. The following officers and delegates were elected: *President*, Peter H. Vlug; *Vice-president*, Clayton Beemer; *Secretary-treasurer*, Charles S. Whalley; *Librarian*, Homer Morton; *Board of Managers*, Charles O. Werft, Maurice Caldwell, and Axel Rickson. Delegates to the Convention are Maurice Caldwell, Luman Sperry, and Jack Wiseman; alternates, Wm. Van Dyke, Homer Morton, and Herbert Guldbrandsen. Delegates were instructed to vote down any increase in the per capita tax unless that increase is used to furnish each member with a copy of convention reports. The meeting was then turned over to our Librarian, Homer Morton.

CHAS. S. WHALLEY, *Sec.*

LOS ANGELES BRANCH

The meeting of the Los Angeles Branch of the American Electroplaters' Society was held May 11, 1938 at the Rosslyn Hotel, with President John L. Merigold presiding. The minutes and financial report of previous meeting were read and accepted. Bills were read and ordered paid.

The following members were elected as officers for the year 1938-1939: *President*, Earl Coffin; *Vice-president*, Ray Bray; *Secretary-treasurer*, Raymond Solivan; *Librarian*, E. R. Holman; *Board of Managers*, E. Lamoureux, C. E. Thornton, C. C. McLaren. Delegates to National Convention, E. R. Williams, E. Lamoureux, Don Bedwell; alternates, E. W. Francis, Earl Coffin, M. D. Rynkofs. Chicago Branch was designated as our proxy in case none of our delegates attend.

Motion pictures supplied by the Board of Education, showing the mining, smelting, and refining of 99% pure nickel, were found to be most interesting as well as educational.

A large portion of the evening was taken up discussing the proposed changes of the Constitution.

Mr. Don Bedwell and Mr. E. R. Holman report that beginning with the June meeting they are prepared to demonstrate rapid and easy methods of analyzing various plating solutions.

Meeting adjourned at 11 p.m.

RAYMOND SOLIVAN, *Sec.-Treas.*

QUESTIONS and ANSWERS

Q. What is the highest temperature that it is safe to bake a die-casting?

Ans. This question raised quite a bit of discussion. Although some said that the kind of plating had much to do with the allowable temperature, most of those present agreed that the type of die-casting used was the most important factor and that, ordinarily, 225° F should not be exceeded. There must be at least .0003 in. of copper under nickel on die-castings to avoid trouble when baking.

Q. Why is hydrofloric acid so popular in the dipping (after cleaning) of die-castings?

Ans. All the experienced die-casting platers agreed that the hydrofloric acid was the best acid to use in avoiding poor adherence because it removed any dark smut from cleaning and caused less darkening in itself than other acids. It also gives a finer etch and attacks all the components of the die-casting more evenly. Even when other acids gave the surface an equally good appearance, the hydrofloric acid gave best final results as to surface and adherence.

Q. What is the best method of stripping copper from die-castings?

Ans. Make the die-castings the anode in a solution of 50% water and 50% commercial 66°Be′ sulfuric acid. Keep temperature below 80° F.; use lead cooling coils if necessary.

Q. How is the strength of hydrochloric acid tested?

Ans. Titrate with tenth normal standard sodium hydroxide solution using methyl orange indicator.

Q. Is there some cheap way of chromium plating small parts?

Ans. Various methods are used. The standard method is to put the small pieces on racks containing many small clips. A method for chromium plating in baskets is described in the May 1938 *Metal Industry*. Some firms are reputedly plating small parts with chromium in a barrel installation. Little information is available on this later type.

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ROCHESTER BRANCH

The Rochester Branch held its regular monthly meeting at the Seneca Hotel on Friday night May 20. Meeting called to order by President Kohlmeier. Regular business was transacted during which Mr. Eugene Paul Swartz and Mr. Kenneth C. Merrill were elected as associate members. The applications of Mr. Michael Fasson as an active and Mr. Ernest Fasson as an associate member were then read and ordered published. The next order of business was election of officers and Mr. Raymond L. DelRosso was elected President, Mr. Chas. Hehr, Vice-president; Mr. Judson R. Elster, Secretary-Treasurer; Mr. Arthur Moore, Librarian. Board of Managers, Mr. F. J. Kohlmeier, Mr. S. P. Gartland and Mr. Raymond J. Berghold. For membership chairman, Mr. Frederick

Bruening was reappointed. Educational chairman, Mr. Francis Dougherty. President Kohlmeier then appointed the following delegates to the convention, Mr. Raymond L. DelRosso, Mr. Sylvester P. Gartland, and Mr. Francis J. Kohlmeier; alternates, Mr. Judson R. Elster, Mr. A. Henry Cameron and Mr. John A. Kushner. The meeting was then turned over to a general discussion of the proposed new constitution and by-laws. After a prolonged discussion of this matter the meeting was turned over to the enjoyment of refreshments and a party for our retiring president, Mr. Kohlmeier. During the course of the party, Mr. Frank Kolb expressed the regret of the branch at having Mr. Kohlmeier relinquish the chair but pledged the support of all members to our new president Mr. Ray L. DelRosso and wished him a successful term of office. At a very late hour the meeting was adjourned.

JUDSON R. ELSTER, *Sec.*

TORONTO BRANCH

May 30th meeting held a week late owing to Victoria Day conflicting with regular schedule and owing to the election of officers and the big circus being in town on the same evening, only 19 members answered the roll call.

President Acheson in the chair asked the members to give the final touches to the new laws of the constitution and Mr. Archie Smith, our delegate to the convention was instructed accordingly. With John Acheson back in the chair and Archie Smith as Vice-President, C. Kemish, H. Hands, W. H. Graham, J. Mclean, and W. Price were elected and with a combination like that, Toronto Branch will be going places. A letter of thanks was read from Mr. W. Bottrell for the flowers—wishing us success and stating that he was on the way to recovery.

Archie Smith gave an outline of his visit to Rochester Branch Annual Banquet, bringing back notes of the various speakers, and when he introduced the copper and nickel plating of zinc base die castings, he started a discussion that lasted longer than he figured, just about as long as it took him to find the Genesee River in Rochester.

Q. How can an old wooden lead-lined tank be cleaned, that is heavily stained with some kind of dye?

Ans. Scour with sodium hydroxide.

Meeting adjourned at 11 p.m.

JAMES S. CAIRNS,
Review Correspondent

MONTREAL BRANCH

The regular monthly meeting of this branch of the society was held at the New Carlton Hotel on Thursday evening, May 26th. Our vice-president, Mr. R. Gordon, in the absence of our president, took the chair.

It was the writer's pleasure to introduce to the members present, Mr. Herbert S. Jordon, chemist with the Canadian Marconi Company, recently elected to active membership in the society. The writer, some few years ago had the pleasure of working with Mr. Jordon and could assure the members that in Mr. Jordon they had acquired a most valuable member.

Mr. Alfred H. Weston of Phillips Electrical Works, Ltd., Brockville, Ont., was elected to membership at this meeting. We look forward to meeting Mr. Weston at an early date.

As this was election night, our Librarian, Mr. Creighton, had made no provision for a paper, but that exponent of silver plating, Mr. Chalut,

started a discussion by remarking on the effects of silver plated drinking wells for birds as compared with cadmium. His experiments so far indicated no harmful effects with the cadmium plated wells on birds in cages. This brought Mr. Harding to his feet with an account of his tests with tropical fish kept in tanks divided into compartments with chrommium plated copper sheets. The water contained salt, the chromium plating was destroyed, and all the fish died. Mr. Harding would like to hear from any other member who has had a similar experience.

It was with deep regret that we had to accept the definite assertion of our president, Mr. L. Lariviere that ill health absolutely prevented him from again accepting the position of president. Our vice-president, Mr. R. Gordon, who several times during the past year had has to take the chair due to the illness of our president was elected to the position of president. Mr. Gordon is the man who copper plates the wax master records for the R. C. A. Victor company, and like his records, is well worth listening to. Mr. Chas. Doherty left the meeting with the position of vice-president; Charlie was the secretary of this branch for many years. To replace him on the board of directors we picked on Mr. R. Chalut, who will find himself in mighty good company with Mr. D. McMullin and Mr. A. Jerome. For delegates, Mr. John H. Feeley, founder of this branch and past supreme president, Mr. T. A. Willis, and Mr. H. S. Jordon both recent but highly respected members, were elected. No change was made in the office of Librarian; why should there be? Mr. E. Creighton knows all the answers. And the secretary is

JOHN T. CRONIN.

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NEWARK BRANCH

The regular meeting of the Newark Branch A.E.S. was held on Friday evening, May 20th, at the Club Room of the Hotel Douglas. The meeting was called to order at 8:45 p.m. with Mr. Philip Sievering presiding. The following officers were present: George Wagner, Secretary; Paul Oldam, Librarian; Roy Stout, Sarg.-at-arms; Samuel Taylor, Samuel Glickenhaus and Thomas Haddow, Trustees.

The minutes of the previous meeting were read and approved.

Mr. Walter Ray Lockwood, one of our newly elected members, tendered his resignation, which was accepted by the branch.

The following communications were read: A letter from Milwaukee Branch asking for a list of the manufacturers in the vicinity of Newark. The secretary was instructed to secure this list and send it on to the Milwaukee Branch. A letter from the Metal Research Association of London, England, asking for a copy of Newark Branch's paper on "Wetting Agents in Nickel Solutions." It was voted that this request be complied with and a copy

forwarded immediately after the Milwaukee Convention. Two letters from the Research Committee and upon motion duly made and seconded it was voted that Newark Branch contribute $25.00 to the Research Fund.

Under new business the question of one meeting a month during the summer months was brought up and it was voted that there shall be one meeting in July, one meeting in August, and one meeting in September, the dates to be the third Friday of these months.

Election of officers for the year 1938-1939 then followed and the newly elected officers are: John Kotches, *President*; Jack Shamis, *Vice-president*; George Wagner, *Secretary*; Nelson Sievering, *Treasurer*; Paul Oldam, *Librarian*; Stephen Leshnick, *Sargeant-at-arms*; William Harrison, Harmon S. Hunt and George Reuter, *Trustees*.

Next on the program was the election of Delegates and Alternates to the Milwaukee Convention. The three delegates are: Horace Smith, George Wagner, Nelson Sievering; the three alternates are: Philip Sievering, Paul Oldam, John Kotches.

Mr. Thomas Haddow then installed the officers in a very appropriate and impressive manner. The meeting from this point on was conducted by Mr. John Kotches, our newly elected president.

Our Librarian, Mr. Oldam, informed the members that the committee for the paper, "Wetting Agents in Nickel Solutions", held a meeting prior to the present meeting. He asked for questions on this paper to give the committee some idea as to what might be expected, when the paper is read at the Convention. Numerous questions were asked and the committee decided to hold another meeting at the Hotel Douglas on Thursday evening, May 26th, at 7:30 p.m., to complete the paper.

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Wilfred S. McKeon, President.
SAMPLES FREE

Forty-two members were present at this meeting which adjourned at 11:30 p.m.

GEORGE WAGNER, *Sec.*

BOSTON BRANCH

Boaton Branch met Thursday, June 2nd, at the Bradford Hotel at 8 p.m., with Vice-president Sage in the chair.

Minutes of the previous meeting were read and approved.

Communications were read and filed, bills read and moved they be paid.

Report of the picnic committee was made and after much discussion on the conditions in the trade it was voted to call it off this year.

It was moved that the Branch hold a fishing trip for the members and their friends. Arrangements will be made by Al. Baker and Arthur Mintie. They will report their plans in a week, and then the Secretary will notify all members by letter as to how many will be in their party.

Bert W. Sage as one of the delegates to the convention read the paper that Boston Branch will present to the convention. It is one of the best papers that the branch has heard in a long time, it touches on the plating business from the time that the plater made his own chemicals to the present day and should make a hit with the delegates.

After the regular order of business, the members got together and had a pep talk on what should be done to make the meetings more interesting to bring out the members. One of the things brought out was that the branch have a chemistry class so that every member will be able to analyze his own solutions as this is the only way that he will be able to keep out of trouble. As some of the members said, every member has his troubles and why not bring them to the meeting? Some member will be able to help him if he can't help himself. It was also suggested that the branch send out letters to the manufacturers and the plating concerns around Boston to see if we can interest them to encourage their platers to become members of the Society. This will be done in the Fall.

Boston Branch will not meet again until the Fall. Members will please make a note of this and watch for the next letter. A. W. GARRETT, *Sec.*

NATIONAL ELECTROPLATERS ASSOCIATION

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A.E.S.

ANNUAL MEETINGS AND PRESIDING OFFICERS

1914	Chicago, Ill.	G. B. Hogaboom
1915	Dayton, O.	H. J. Hansjosten
1916	Cleveland, O.	Walter Barrows
1917	St. Louis, Mo.	H. H. Williams
1918	Detroit, Mich.	Walter J. Fraine
1919	Philadelphia, Pa.	Walter J. Fraine
1920	Rochester, N. Y.	O. E. Servis
1921	Indianapolis, Ind.	S. P. Gartland
1922	Cincinnati, O.	Philip Uhl
1923	Providence, R. I.	Walter J. Allen
1924	Milwaukee, Wis.	J. E. Sterling
1925	Montreal, Canada	F. J. Hanlon
1926	Newark, N. J.	E. J. Musick
1927	Toledo, Ohio	F. C. Mesle
1928	Toronto, Canada	John H. Feeley
1929	Detroit, Mich.	Horace Smith
1930	Washington, D. C.	Horace Smith
1931	Rochester, N. Y.	George Gehling
1932	Philadelphia, Pa.	Philip Sievering
1933	Chicago, Ill.	C. A. Van Dereau
1934	Detroit, Mich.	C. A. Van Dereau
1935	Bridgeport, Conn.	H. A. Gilbertson
1936	Cleveland, Ohio	T. F. Slattery
1937	New York City	E. Steen Thompson
1938	Milwaukee, Wis.	A. B. Wilson

Research Department

I think we all agree that research must be continued in spite of all the obstacles we may meet; not only to continue research, but to broaden its scope.

The greatest problem in our research is financing. Up to this time that has been a hit and miss affair, perhaps too akin to charity, to be a definite step forward.

Although we as members of the A.E.S. plus the interest of our associates, have up to this time laid the ground work of something that is really a step forward, the real winner, in our research work, is the manufacturer. If he, as an individual, were to finance the program that we have undertaken, he would have to spend thousands of dollars to get the results we have obtained, and by so doing we have given him a selling point for his goods. The ground work of research has been laid by the A.E.S., A.S.T.M., and others, but the future of research should be up to the real winner, as the continuance of research becomes more vital each year; also I do not feel we could ever be in the position to commercialize on our research work. That is essential if we are to get the most out of research.

With these thoughts in mind I would like to offer a plan, but before I submit this plan for your perusal please understand this is only an idea subject to changes to meet the conditions which may eventually be present.

The plan is as follows:

That an affliate or associate organization to the A.E.S. be formed, membership comprising of those interested in the manufacturing, selling, or in any way concerned with electroplating.

The duties of this organization to be a determination of certain specifications for the various needs of the finished article;

To see that where they are personally concerned that these approved specifications are met;

To determine a stamp or mark on the finished product, that has and is meeting these specifications;

To educate the public when buying plated articles to look for this or these said stamps;

To finance further research, or all future research programs after the founding of this said organization;

To determine some means of checking up on all articles, so marked as they have specified.

Should such an organization become an accomplished fact, it shall have no jurisdiction over the A.E.S.

In submitting this I hope and realize that there are possibilities of a much better plan than this and my object is to find such a plan. I feel that there are great possibilities in some such plan, and if carried out right, will tend to strengthen our position in industry.

BERT SAGE.

CONNECTICUT PLATERS HOLD AN OUTDOOR MEETING AT BETHLEHEM

Bob Leathers' Party is a Great Success

Leacrest, the home of the president of the Lea Manufacturing Company, was a busy place on Saturday, May 21st, when the plating fraternity met for another enjoyable outing.

Early in the afternoon a softball game was the attraction; we don't know who won, but we noticed that Dick Crane's team perked up a little after Dick invited himself in to pitch. There were enough arguments, home runs, and errors to make everyone feel happy. Presumably the platers' all star team with Charlie Nardozzi as captain were the winners. The prize was two cartons of cigarettes.

After the ball game luch was served, each one helping himself to the hot dogs and hamburgers. "Platers' refreshments" also were in evidence and helped to quench that thirsty feeling, so common to members of the A.E.S. and other organizations.

Much interest was manifested in the trap shooting contest in charge of Earl Couch. Mr. Evans of Remington Arms gave the boys instructions in the manly art during the afternoon. Vincent Kacerguis carried off the honors in this event and was presented with a pair of wading boots.

In another section of the grounds archery was being practiced under George Muscio's capable instruction. Ted Hill came out on top and was given a syphon sparklet bottle.

Horseshoe pitching was also on the program and kept many of the boys out of mischief. We don't know the names of the winners, but they weren't Joe Sullivan or Jack Barry. Doc Kellner gave the winners the "once over" for a while and decided they were too good for him.

Roland Ducette is a good mixer; he had charge of the refreshment stand. Bob Mooney makes a good bill collector; he got nearly all of them. Tom Chamberlain tried to hold a meeting, but the boys were out for a good time. Oliver Sizelove and Sou Bob came all the way from Kearney. All Bob needs to be a good horseshoe pitcher is a partner.

Well, everyone had a good time. The day was all that could be desired. There is no more beautiful country anywhere than the spot Bob Leather picked for his home. What a place for an outing! Let's have another one!

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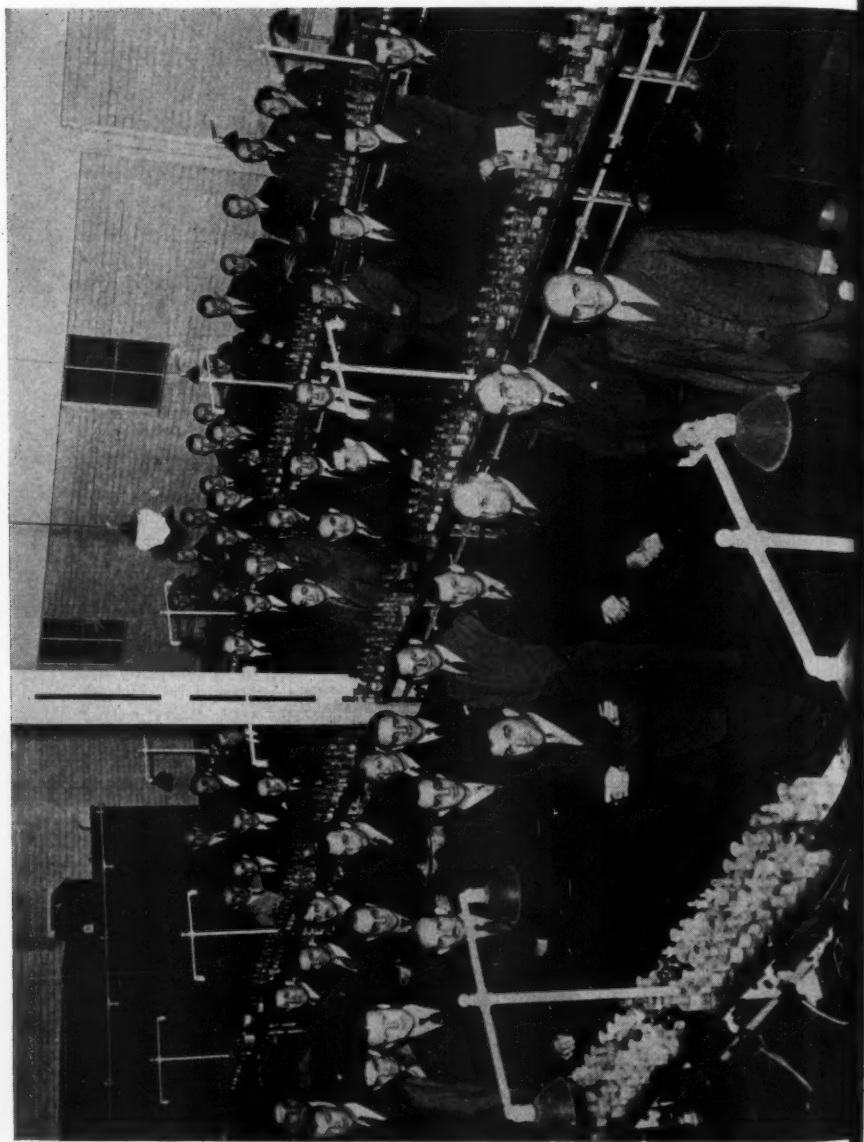

549 Savin Ave., West Haven, Conn.

Dear Bill,

I think it is about time that you heard from the New Haven Branch of the A.E.S. We have been rather lax in getting news to you regarding the many educational and social activities which took place here in New Haven so I am taking it upon myself to write a summary of the events.

Starting way back last summer during the "no meeting" period, Tom Chamberlain, chairman of the educational committee along with a couple of cohorts, sent out a cleverly drawn-up questionnaire to each of the members to ascertain just what sort of an educational program he would like. It was decided to have a guest speaker once every month and a course in the analyses of plating solutions.

The monthly educational sessions which were open meetings proved to be a great success. Notices of these meetings were sent to members of the Bridgeport, Waterbury and Hartford Branches as well as the New Haven Branch members. Members of many other educational societies—the Mechanical Engineers, American Society for Metals as well as some Yale students attended these affairs.

The open meetings were held in a large lecture hall at the Sterling Chemistry Laboratory of Yale University where there were fine facilities for black-board demonstrations, lantern slides, plating demonstrations, and experimental work. On the average, some 175—200 people were present at these sessions. At the conclusion of each lecture, the meetings were thrown open to the audience for discussion and questions. Many interesting problems were brought up at this time. Sometimes these "after lecture vox pops" lasted as long as an hour.

Following is a list of the speakers, etc., and the dates of the talks.

1. Oct. 5, 1937—Dr. W. Blum, chemist connected with the U. S. Dept of Commerce, National Bureau of Standards, Washington, D. C.
   Subject: "Testing of Electro-Plated Coatings."
2. Nov. 2, 1937—Dr. A. Kenneth Graham, chemical engineer of the A. Kenneth Graham & Associates, Chemical Engineers and Consultants.
   Subject: "The Rochelle Salt Copper Plating Bath."
3. Dec. 7, 1937—Dr. Edmond H. Bucy, technical director of the coating department of the Zapon Co., Division of the Atlas Powder Co.
   Subject: "The Manufacturing of Lacquer."
4. Jan. 4, 1938—(1) Vitaphone Movie—"The Wonder World of Chemistry," through kindness of Dupont Co.
   (2) Mr. H. Garner, International Silver Co., a member of the New Haven Branch.
   Subject: "Cutting, Buffing and Coloring Methods."
   (3) Mr. J. T. Sullivan, New Haven Clock Co., also a member of the New Haven Branch.
   Subject: "The B. E. K. Gold Plating Process."
5. Feb. 8, 1938—Mr. Wm. Phillips of the Research Division of the General Motors Corporation, Detroit, Mich.
   Subject: "Graphic Presentation of Plating Solutions."
6. March 1, 1938—Mr. B. H. McGar, Assistant director of research at the Chase Brass and Copper Co., Waterbury, Conn.
   Subject: "Annealing in Controlled Atmospheres."
7. April 5, 1938—Mr. R. O. Hull of the E. I. Dupont de Nemours & Co., Inc.
   Subject: "Bright Zinc Plating."
8. May 3, 1938—Dr. Louis Weisberg of Louis Weisberg Inc., Engineers-Chemists, New York City.
   Subject: "Bright Nickel Plating."

The class in the analyses of plating solutions got under way Thursday, Jan. 6, at the Sterling Chemistry Laboratory. This course was held on successive weeks for 18 sessions, and was under the leadership of Dr. J. Vance of the Yale Department of Chemistry and Tom Chamberlain of the educational committee, who happens to a be Yale graduate. Some 53 persons

took this course and the attendance was excellent; everybody completing the course except three. Every member of the class had his own desk and chemical apparatus and performed his own experiments. Serving as laboratory assistants were the following men, all members of the New Haven Branch: Dr. H. Kellner, W. Bridgett, H. Smith, S. Carrano, C. Costello, J. Downs, and J. Sullivan. The complete analysis of the following solutions was taken up:

(1) Silver Solution { Metal / Free Cyanide
(2) Cyanide Copper { Metal / Free Cyanide
(3) Nickel Solutions { Chloride / Metal / pH
(4) Acid Copper { Metal / Acid
(5) Chromium Solutions { Metal / Sulfate
(6) Cyanide Zinc { Metal / Total Cyanide / Total Alkali
(7) Brass and Bronze Solutions { Metal (copper and zinc) / free cyanide
(8) Cadmium Solutions { Metal / total cyanide / free cyanide / combined cyanide
(9) Tin Solutions { metal / alkali
(10) Gold Solutions { metal / free aycnide
(11) Cyanide Solutions—Carbonate content

Following the laboratory period on each evening, the class adjourned to a small lecture room where informal discussions on plating and metal finishing took place.

Some interesting side glances noted by the assistants:

(1) Bob Mooney's ability to finish experiments before any one else.

(2) Jack Daley climbing up a burette to read the "end point."

(3) Leroy Brown, the agile chemist who can drop a glass flask and catch it with his feet before it hits the floor.

(4) C. Heyniger's questions which sometimes puzzled the assistants.

(5) The odd shapes into which Jack English could bend glass.

(6) The accuracy of Henry Creamer's results.

(7) The only man who can pick up a hot beaker without a pair of tongs, Al Jackle.

(8) Tony Sarraco who refused to use anything but a short burette for his titrations.

The week following the last class, Thursday, May 26, a banquet was held at the Hotel Garde. Charlie Koelbl who headed the banquet committee, certainly did a fine job. A fine chicken dinner got the evening off to a good start. Following this an entertainment program got under way which was featured by the bird imitations of S. Allen, a member of the New Haven Branch, and the piano playing of Charlie Koelbl. After the entertainment, Bill Kennedy gave a very interesting talk which was well received. Joe Downs, the toastmaster, then called upon Mr. William Ruch of the Chase Brass Co., who lauded the efforts of the New Haven Branch and the fine course which had just finished. Tom Chamberlain was presented with a pen and pencil set, a gift from the class. The evening was concluded by a fine talk by Dr. J. Vance, who expressed surprise and satisfaction at the fine manner in which the students handled themselves in the laboratory, and the interest which they showed throughout the entire course. He then presented certificates to the successful members of the course.

The newly elected officers of the New Haven Branch are as follows: *President*, Joe Downs; *Vice-president*, Henry Creamer; *Secretary and treasurer*, Joe Sullivan; *Chairman of Educational Committee*, Tom Chamberlain; *Members*

NEW PROBLEMS?

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of Board of Governors, John Oberender, Leroy Brown, Henry Smith; *Sergeant-at-arms*, Robert Gray.

I am enclosing a picture of the chemistry class.

JOE SULLIVAN.

NEW HOPPER-TYPE BARREL PLATING EQUIPMENT

Automatic handling of barrel plating work has been made commercially practical by the use of simple, inexpensive hopper equipment designed by the Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturers of electroplating equipment and supplies. The purpose of this type of operation is lower production cost; proper control of treatments; large production capacity in small floor space; low maintenance cost; segregation of various classes or small batches of work without confusion; in general, improved and more effective treatment of work than is possible with dipping baskets.

An interesting installation of this type is in operation at the plant of a New England manufacturer. The work which has previously been ball rolled or sand rolled is dropped into the hopper of the first tank and receives a cold water rinse. It then proceeds from one hopper to another, through a cleaner, a cold water rinse, an acid dip, another cold water rinse, and then to an empty plating barrel cylinder. After being plated for the required time, the work goes again from one hopper to another, through a cold rinse, then a hot rinse and finally into Mercil type centrifugal drier, where all the moisture is removed. From the drier the work is dropped into a suitable handling receptacle and travels through the plant for further operations.

The lifting of the hoppers for dumping can be affected by hand or by electric hoist, like the handling of the plating barrel cylinders. The operator follows a regular routine for normal loads and speeds, handling all the loads in rotation. He places the plating barrel cylinders in the proper location in tanks, moving them ahead as production requires and dumps them into the hopper to remove the work for final cleaning and rinsing operations preparatory to drying.

Several different designs of hoppers are in use in different locations, depending upon the size of the articles and the shape of the bottom best suited for rinsing and treatment of the work. The hoppers are made in either plain steel or Monel metal. The tanks are plain steel or rubber lined, with bottom drain outlets and substantial overflow dams. Each hopper load is equivalent to the plating cylinder load, which varies from 50 to 150 lbs. Adequate rinsing is assured by proper circulation of the liquid through the overflow dam, but for work requiring special treatment, a simple reciprocating device is added which will continuously swish the hopper through a vertical stroke of about six inches.

Where loads are heavy and the rate of operation is high, automatic lifting and lowering of loads is more productive than manual hoist operation. It has been found practical to adapt the standard Mercil type motor drive, as used in the original Hanson-Van Winkle-Munning plating barrel apparatus, to operate these hoppers. This drive consists of a one-quarter horse power motor, direct connected to a worm gear reducer with a rubber cushion coupling. On the end of the slow speed reducer shaft, a steel pinion drives a large gear which, in turn, operates a quadrant gear firmly keyed to the hopper shaft. A limit switch (shown in the illustration at one end of the tank directly in front of the large gear) offers a positive control for raising and lowering the hopper as it is geared directly to the driving unit. Time required, about thirty seconds.

Each tank has an individual motor drive and limit switch, thus permitting the addition of as many hopper units as required, depending upon the number of treatments involved, and also controlling the entire assembly automatically from a master panel board. The control board is equipped with dials to give selected "dwells" (immersion of the hopper load in the solution) from twenty seconds to four minutes per tank. Added safety features are start and stop

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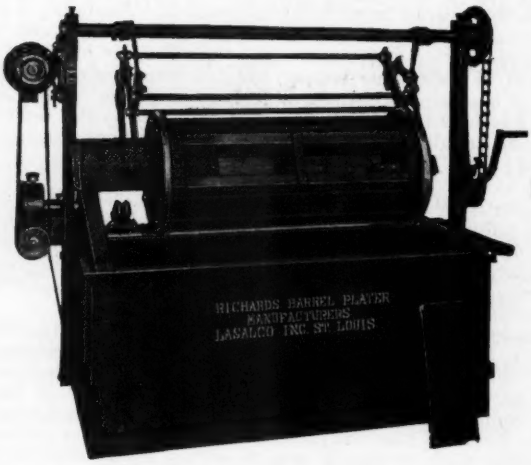

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push buttons and a system of synchronizing all the drives to maintain regularity in the flow of work from tank to tank, all properly timed.

The work load varies from 50 to 150 pounds. Assuming a treatment of 1½ minutes dwell in each tank and 30 seconds for raising and lowering the hopper, the production flow would equal thirty hopper loads per hour. With an average of 75 pounds per hopper, the production would be 2,250 pounds per hour. It is possible to handle all operations, including that of the plating barrels, with a crew of two men, giving a very low labor cost together with perfect timing in all the treatments and rinses, and assuring a first-rate plating job.

ELECTROPLATES OF COBALT-NICKEL

A recent publication has an important message to all manufacturers of metal products, from safety pins to automobiles, including electrical appliances, lighting fixtures, plumbing fixtures, radios, phonographs, musical instruments, office equipment, vending machines, silverware, jewelry and even electrotypes and printing plates.

At the Savannah meeting of the Electrochemical Society, held April 27, 30, 1938, Dr. Louis Weisberg, consulting chemist and president Louis Weisberg, Inc., New York, read a paper on the Commercial Electrodeposition of Cobalt-Nickel Alloys. The electrodeposition of these alloys has attained a significant commercial position within a little more than two years as a result of the discovery that the presence of sodium formate and formaldehyde in the sulphate bath renders it easy to obtain bright deposits of the alloy without polishing or buffing after plating. The composition of the solution used and the operating conditions necessary for producing such deposits are described. The deposits are normally very ductile and can be bent or twisted without lifting or peeling. Pitting and double plate are rarely encountered. Brittleness, when it does occur, is due to the presence of impurities. Methods of eliminating impurities to maintain optimum brightness and ductility are specified.

Cobalt-Nickel deposits find their chief application in place of nickel as an undercoating for chromium. They are also being used as undercoatings for silver and gold. The plate has found use in some cases where no overplate is applied. Here the blue-white color of the alloy, as compared with nickel, is generally considered an advantage.

Another interesting use that has developed is that for plating stereotypes. Here brightness is not the main factor, although it is desirable. Toughness and ductility are the main requirements, since these are essential to stand the wear to which the printing surface is subjected in the course of a long run.

KOCOUR ANALYTICAL SETS

For Measuring and Controlling the pH (Acidity or Alkalinity) of Solutions. Colorimetric Comparator Method Used for Nickel, Acid Zinc, Copper, Cyanide, Brass, and Other Solutions.

The use of these sets enables the electroplater to determine the pH of his solutions and then determine just how much acid or ammonia or other correcting medium to add to change the pH to a desired point. This latter feature will be appreciated for its time saving convenience.

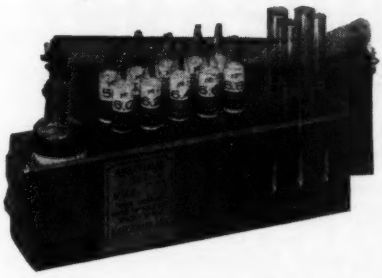
The color obtained from brass solution is dependent to a large extent on pH.

The comparator set consists of a well made hardwood box fitted with nickel plated brass hardware, nine color standards having easily read labels, a sealed tube of water, four graduated test tubes, a graduated dropping pipette, a bottle of indicator solution, a brush and complete instructions. The color standards will retain their proper colors indefinitely if kept away from excessive heat and light. Replacements for the set can always be obtained from the manufacturer.

The correction set consists of a cardboard case with two bottles of standardized solutions and calibrated droppers complete with directions.

NEW!

NOT ONLY *Reads* pH BUT DETERMINES JUST HOW MUCH CORRECTION IS NECESSARY



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The Abstract Section

R. M. GOODSELL, *Chairman, Program and Educational Committee*

Barrel Finishing of Metal Products. By H. LEROY BEAVER. *Product Finishing*, May, 1938, pp. 14-20—Article discusses barrel finishing of silver and silver-plated wares. This is a useful maintenance device for keeping silverware of large establishments, as hotels, restaurants, etc., in bright, polished condition. Work is put into barrels with steel burnishing material and soap and tumbled till brilliantly polished. Process first started in Switzerland in 1911. Was started in U. S. in 1913. Barrels are usually about 8″ in diameter and 12″—12″ long with combination type for flat and hollow ware. Steel burnishing material used is a mixture of cones, balls, diagonals, diamondstels, etc., designed to reach every corner and recess. Ubersax patent method controls speed of barrel so articles are held suspended within the mass and do not tumble freely, as this causes scratches. According to tests run, only an infinitesimal amount of silver is removed.

PHIL J. RITZENTHALER.

METALS AND ALLOYS ABSTRACTS

1. Metal Coloring. By DR. C. B. F. YOUNG. *Am. Soc. Metals*, Preprint No. 26, 1937, pp. 1-14—Chemical solutions for coloring Al, Cd, Cr, Cu, Fe, Mg, Sn, Zn, and brass and electrochemical processes for coloring Al, Cr, Mg, Ni, and Co and Sn are covered. Corrosion resistance and fastness of coatings are discussed. An interesting alloy of Co and Ni which has color of Ag and better corrosion resistance than Ni is discussed.

2. Porosity Tests on Zinc Coated Iron and Steel. By W. A. KOEHLER and R. O. BURFORD. *Trans. Electrochem. Soc.*, Vol. **70**, 1936, pp. 397-400—Walker test, which uses an external E.M.F. to produce ferrous ions at points of exposure gave good results in finding pinholes. Paper impregnated with test solution can also be used, with or without external E.M.F. Agar-Agar is better than gelatin when used directly on metal, on paper, gelatin was better.

3. Flow of Hydrogen Through Steel. By W. BAUKLOH and W. RETZLAFF. *Arch. Eisenhüttenw*, Vol. **11**, Aug. 1937, pp. 97-99—Original Work. Studies on 0.2 mm. sheet of 0.1% C steel, the grain of which was coarsened by long heating at 900-1000°C in H_2, indicated that grain size had practically no influence on rate of flow of Hydrogen through steel in electrolytic pickling. H_2 diffuses through grain itself and rate of flow depends mainly on surface conditions.

4. Effect of Electrolytic Pickling on Deep-draining Properties of Steel. By W. BAUKLOH and K. GEHLEN. *Arch. Eisenhüttenw*, Vol. **11**, Nov. 1937, pp. 253-8—Orignial. Effect of H_2SO_4 concentration, time, temp., and current density in electrolytic pickling of 0.09 C steel sheet was studied, as also additions of Se, As, S, P, Pt, Sn, and Zn on deep draining properties, determined immediately after pickling. Elements such as As, S, and P, which increased hydrogen absorption, decrease drawability.

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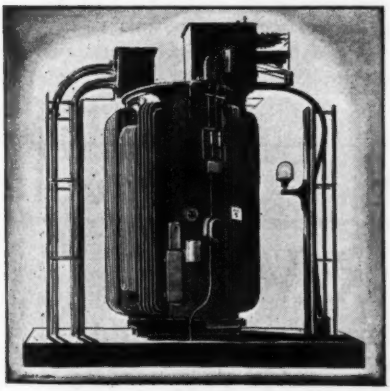

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5. Phosphoric Pickling. *Engineer*, Vol. **164**, Dec. 10, 1937, p. 665—Descriptive. Process used by Whessoe Foundry and Eng. Co., Ltd., of Darlington, England. Consists first in descaling in sulfuric acid, then washing in water and transferring to phosphoric acid bath. Latter acid displaces H_2SO_4 and leaves thin $Fe_2(PO_4)_3$ film on surface which retards rust and electrochemical action.

6. Relation Between Surface Condition and Mechanical Properties of Chromium. By M. CYMBOLISTE. *Comp. Rend.*, Vol. **206**, Jan. 24, 1938, pp. 247-249—Low results in torsional tests on chrome deposits occur in areas of surface irregularity which, in turn, may be attributed to lack of uniform crystal structure and the inclusion of non-metallic impurities in deposit.

7. Electrolytic Dip Coloring by Molydenum Oxide. H. KRAUSE. *Oberflüchtechnic*, Vol. **15**, Jan. 18, 1938, pp. 11-12—Coloring by electrolysis in mo-sesquioxide is useful when other methods introduce modifications in the metal. The bath contains 10 g. ammonium molybdate and 10-20 g. ammonium nitrate per liter and operated at 2 volts and 0.2-0.3 amps/dec^2 current density. Irridescent colors starting with yellow, gold, green, red, blue, brown, and black are produced. Patents covering application with Fe, Zn, Al, Sn, Cd, and Pb are cited.

PHIL J. RITZENTHALER.

A Little-known Cause for Poor Adherence of Electrodeposits. By J. LIGER. *Galvano*, March 1938, p. 19—The harmful effect of colloids in plating baths has been known a long time. Jacquet has shown that traces of certain colloids in acid copper baths results in adsorption of these colloids at the metal surfaces and causes non-adherence of deposits. It is equally true that traces of certain colloids in rinse waters can be just as harmful. Glue from polishing wheels is particularly dangerous. Such contaminations must be carefully guarded against by the plater, and rinses should be made in running water.

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Magnus Chemical Company, Inc., Garwood, N. J., manufacturers of cleaning materials, industrial soaps, metallic soaps, sulfonated oils, emulsifying agents and metal working lubricants announces three appointments as follows:

Carl Geyer as sales representative in Ohio and West Virginia;

Ralph Neely becomes a resident sales representative in California;

Carl Steinberg will represent Magnus in sections of Pennsylvania.

NEW ABRASIVES

Backed by years of experience in the polishing field especially in the use of polishing cements, the M. P. Iding Disc Grinding Compound Company, Inc., of Milwaukee, Wisconsin, recently concluded extensive research with abrasives in conjunction with one of the largest manufacturers of abrasive in the world, for use with their Original Polishing Cements.

As a result they are now announcing sales of their new product, manufactured exclusively for them. For any need or job they have ready for sale a specially prepared Aluminum Oxide abrasive as well as a Silicon Carbide abrasive.

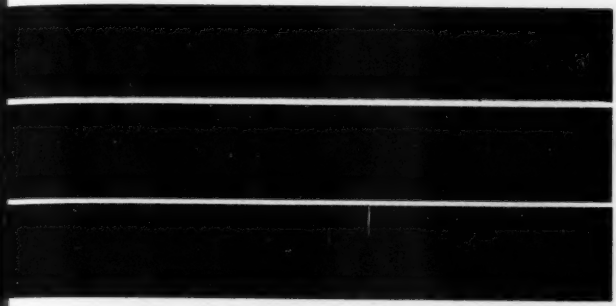
IDILITE, their Aluminum Oxide abrasive is manufactured in two types: The ET types or etched grains possess very high capillarity and extraordinary sharp-cutting qualities.

The NT types or non-etched grains possess long-wearing qualities and have been observed to produce much brighter finishes when used with cements.

IDILON, their Silicon Carbide abrasive, finds special use and gives exceptional results when used to polish grey iron of all kinds.

IDING is now prepared to furnish these grains in any size or type from pound lots to carloads. A price list will be gladly furnished on request.

These abrasives, IDILITE and IDILON, are quality merchandise and have the full assurance of the reliable name of IDING as well as of the manufacturers that they are at least equal to, if not better than, any abrasive now on the market, and the M. P. Iding Company will gladly fill any orders on this basis.



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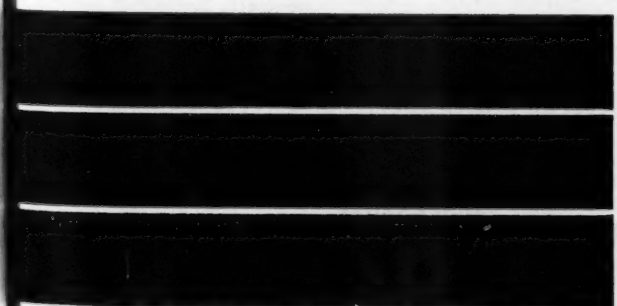

Membership Report

To June 1, 1938

ELECTIONS

Kenneth C. Merrill, 1063 North St., Rochester, N. Y.
Associate, Rochester Branch

Eugene P. Swartz, 1206 Atlantic Ave., Rochester, N. Y.
Associate, Rochester Branch

G. G. Southall, 5-6-7 Harford St., Birmingham, England.
Associate, Springfield Branch

Floyd M. Erlenmeyer, 253 Alexander St., Rochester, N. Y.
Associate, Rochester Branch

Alfred H. Weston, 222 Church St., Brockville, Ont.
Active, Montreal Branch

Herbert S. Jordon, Canadian Marconi Co., Montreal, Canada.
Active, Montreal Branch

Thomas A. Willis, 1443 Galt Ave., Cote, St. Paul, Montreal.
Active, Montreal Branch

APPLICATIONS

Ernest Fasson, 584 Smith St., Rochester, N. Y. Associate, Rochester Branch

Michael Fasson, 584 Smith St., Rochester, N. Y. Active, Rochester Branch

Dr. Maurice Huisman, National Bureau of Standards, Washington, D. C.
Baltimore-Washington Branch

C. W. Pimper, Jr., 29 Primrose St., Chevy Chase, Md.
Baltimore-Washington Branch

Stanley J. Hillsdon, 34 Marion St., Guildford, New South Wales, Australia.
Associate, Los Angeles Branch

Dr. Linus M. Webb, 218 Congress Ave., Rochester, N. Y.
Associate, Rochester Branch

RESIGNATION

Lionel Smith, 415 Meridian St., Anderson, Ind. — Anderson Branch

SUSPENSION

Jesse Wilson, Anderson, Ind. — Anderson Branch

DEATH

W. J. Rauen, 3449 Grand Blvd., Brookfield, Ill. — Chicago Branch